The WELDING ENGINEER

JULY, 1953

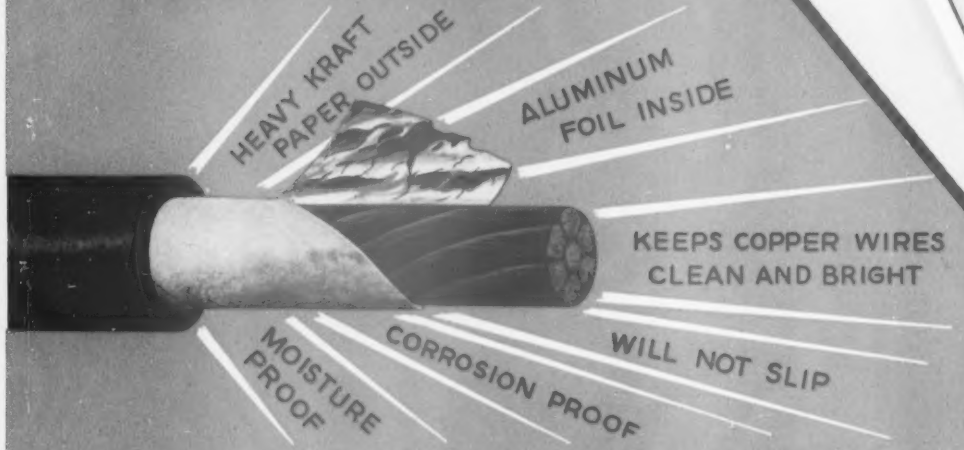
35¢

IN THIS ISSUE: **Atom Apple . . .** page 23

A McGRAW-HILL PUBLICATION

TOUGH
EXTRA FLEXIBLE
EASY to USE

FOR 50 YEARS Wiremaker for Industry



To You,

Belden's Golden Anniversary Means

—product performance that can come only from a "know-how" that has grown through actual service since the early days of the construction industry.

—an ability to cooperate in pioneering new wires to meet or anticipate industry's growing needs.

In the years that follow This Belden Program Is—

TO BE CONTINUED

Belden Welding Cable FEATURES

THE CONDUCTOR

The conductor is composed of many electrically pure copper strands. Each strand is accurately drawn and annealed. Annealing makes the wire soft and flexible.

Thousands of copper strands are grouped into seven divisions, six of which are positioned concentrically around the center group. The strain of flexing is distributed equally throughout all the strands.

Conductor flexibility is the first important step in building desirable welding cable.

THE SEPARATOR

The separator on Belden cable consists of tough kraft paper armorized with aluminum foil. This is an exclusive development.

The aluminum foil faces against the conductor and prevents moisture and chemicals (such as sulphur) from reaching the copper conductor. This means the copper conductor will remain clean and bright.

The aluminum foil also hugs the copper conductor tightly and prevents the jacket from slipping on the conductor.

THE JACKET

The Belden jacket compound has been scientifically formulated with the latest in protective ingredients to insure maximum resistance to the destructive effects of heat and time. This rubber jacket is tested for aging in an oxygen bomb under heat for 14 days, approximately equivalent to 10½ years' service. It still remains lively and flexible after such exposure.

Adequate electrical insulating properties have been developed for the jacket compound.

Specify Belden Belden Manufacturing Co., 4677-A W. Van Buren St., Chicago 44, Illinois

Belden
Welding CABLE

A new, easy to use E-6010 type electrode

HOBART No. 10

Better Welds . . . and faster

Right down to the stub, a Hobart "10" electrode is chuck full of welding ease and efficiency. An all-position DC electrode, it has a stable, deeply penetrating arc — deposits a smooth, flat bead of high tensile strength and ductility — assures non-porous welds and quick, easy slag removal.

Virtually an all-purpose rod, the Hobart "10" is widely used in the welding of high pressure and mild steel piping, pipe lines, structural steel, oil well casings, boilers, storage tanks, ships, unfired pressure vessels, machinery of all kinds, truck frames, bridges and piers, freight cars, wrought iron fabrications, etc. Especially well adapted for work where tie-up stresses are involved—or where the weld must be susceptible to flanging or cold bending and forging—the "10" is also used for the welding of many low alloy, high tensile steels where the thickness of section is ¼" or less.

Do it better with Hobart electrodes

The "10" is just another example of a Hobart Electrode designed to give you better, faster welds at lower cost. Made in a complete range of types and sizes, there's a Hobart Electrode that's just right for you — whatever your work may be.

Samples FREE!

Simply tell us about your work . . .

We'll recommend the electrode best suited to your needs—and will send you FREE samples to try on your next job. Fill out and mail coupon today!

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Used by the U. S. Government and welding trades where FAST, DEPENDABLE performance is a must

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1000 Combinations of welding heat at your fingertips.

Remote Control lets you make fine welding adjustments right at the work.

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● The new **series 548** and **549 Cover Goggles** by CESCO will fit comfortably over all popular styles of men's or women's glasses. A 20% increase in size over similar goggles permits clearance of even the modern extreme styles of personal glasses.

Newly designed, contoured edges eliminate pressure points on the nose. These curved, wide bearing surfaces also seal against the entrance of flying particles or light flashes. Larger air space within goggle reduces fogging.

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Simplified buckle arrangement adjusts bridge width easily. Choice of 3 adjustable headbands: elastic, flat rubber, or Comfort King round rubber with no metal slides or buckles.

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See or write your CESCO safety equipment distributor for full details

New CESCO **Cover Goggles fit** well over all popular styles of glasses—even over extreme types such as these.

FEATURES

Lightweight, sturdy plastic with contour edges. Weight is well-distributed for comfort and safety.

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JULY, 1953

Cover: *Pretty Esther Sonn, of the Knolls Atomic Power Laboratory (operated by General Electric Co. for AEC) is peering into a plastic model of the 225-ft-diameter steel sphere that will house the prototype of an atomic power plant for submarines. Welding details of the sphere on page 23.*

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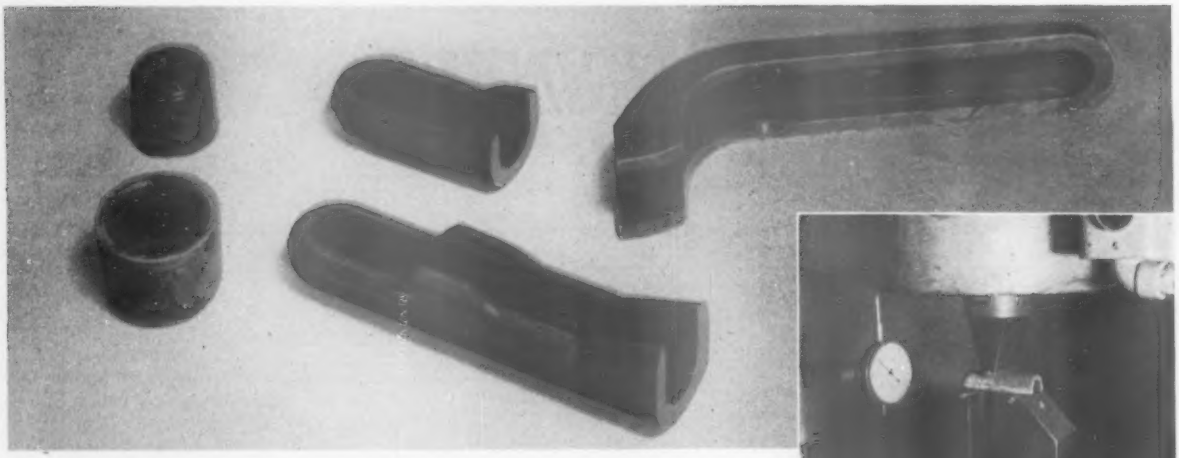


Newly Developed Glass Fiber Insulation gives longer trouble-free life to Jackson Holders

High heat, and, in many cases, high impact, make jaw insulators the most vulnerable parts of any arc welding electrode holder.

Jackson Products, pioneer manufacturer of insulated electrode holders, has time and again brought out worthwhile improvements in both the design and composition of holder insulators.

This time, here's the news: Not only the jaw insulators, but all the insulators on the entire line of Jackson Insulated Holders, are now made of an entirely new thermosetting material, all glass fiber reinforced, that exceeds in durability, by a wide margin, any material so far used for this purpose.

As a constant check on their quality, we have these insulators periodically tested by independent laboratories . . . not just sample bars of the same material, but the actual jaw insulators, completely fabricated, countersunk screw holes and all.

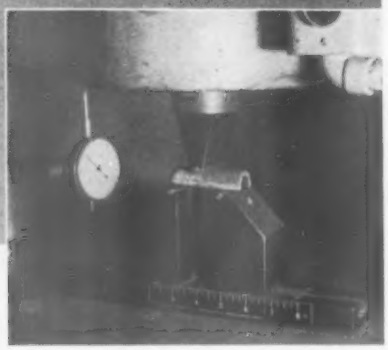
Compared to the jaw insulators previously used, these new pieces show greater strength under compression, more than twice the strength under flexure, and more than eight times the strength under impact. Electric furnace tests at temperatures of 500, 1,000 and 2,000° F. prove that the new Jackson Insulators retain their shape and their full insulative characteristics at temperatures well above those normally encountered.

More good news: These superior insulators are furnished on the holders at no extra cost, and as replacement parts at no increase in price. They still cost less than other makes.

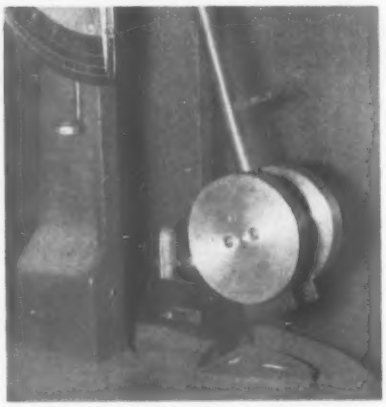
New Holder AW-C with the new insulation, shown in detail above.

Sold World Wide . . . through Distributors and Dealers.

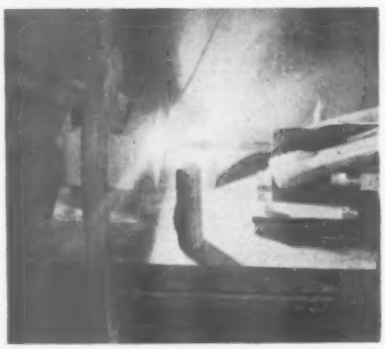
JACKSON
PRODUCTS
WARREN · MICHIGAN



FLEXURE TEST shows insulator, supported two inches apart, with load applied downward at the center.

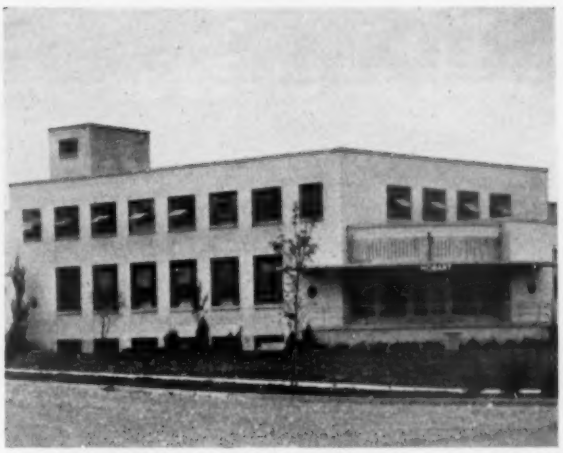


IMPACT TEST shows insulator, held vertical in vise, about to be hit by pendulum at 16 foot-pounds.



The CARBON ARC TEST is part of continuous quality control at Jackson's Plastics Department. The 1,300° F. heat applied by this method, at a distance of two inches from the test pieces, is comparable to the temperature normally radiated by two-inch electrode stubs.

MODEL of new York, Pa., plant of G-E welding department is checked by C. I. McGuffie and R. C. Freeman



NEW HOBART electrode plant at Troy, O, is shown here in end view. Cost of new facility is $3,000,000

NEWS

G-E Welding Department Will Move to York, Pa.

THE General Electric Company's Welding Department, located in Fitchburg, Mass., since 1946, will be transferred to York, Pa., by the end of March, 1954, according to R. C. Freeman, general manager of the department.

The move will enable both the welding department and the company's small turbine and supercharger department (which will remain in Fitchburg) to expand for predicted increases in business.

The G-E welding department, according to Mr. Freeman, is in the process of following through on a three-point program of reorganization, namely that of standardization, integration and mechanization of operations. For instance, the York plant will allow more G-E manufacture of components, many of which have been produced by outside vendors.

C. I. McGuffie, manager of marketing for the welding department, stated that the York plant will give much better customer service. Some 70% of all welding industry business exists in a belt extending from Chicago to New York City, the area in which the new plant will be situated. Mr. Freeman stated that 50 to 60 key executives and technicians will be transferred to the new plant.

Electrode Packaging Talked

The Army Ordnance electrode group of the Metallurgical Advisory Committee on Welding Armor, recently looked over drafts of a revised packaging specification for electrode cans. The revised specification was drafted from suggestions offered by welding industry packaging experts. It calls for a box having outside dimensions of 48 by 11 inches with a choice of heights for 14-in. or 18-in. electrode cans. Cans will be separated by ¼-in. by 40-in. wooden spacers.

J. J. Burke of Watertown Arsenal is preparing the drafts on austenitic electrode cans which will be submitted for committee approval. The committee was formed to coordinate the packaging requirements for the Army and Navy and various government agencies, as well as to simplify electrode specifications.

A principal reason for selection of 40-lb containers for low-hydrogen electrodes was the availability of special dies. These dies were originally tooled for shipping containers for artillery shells.

Hobart Electrode Plant Shows Faith in Future

THE NEW $3,000,000 electrode plant recently put in full production by Hobart Brothers Co., Troy, O., is a symbol of faith in the future of welding. Completely new are shipping and receiving docks for both rail and truck transportation, chemical and wire storage facilities, as well as production, quality control, testing, research and experimental departments. New drying ovens are said to be the most modern made for automatically controlling the moisture content of electrode coatings.

Made of steel and masonry, the new building is so designed and built that when expansion is required, a wall can be removed with little trouble.

* * *

Defense Materials System Now An Official Agency

JUNE 30th saw the Defense Materials System (DMS) take over the duties of NPA. In May there was some doubt as to how it would function and with what personnel. It was not fully decided whether the department will be under Secretary Weeks of the Department of Commerce.

However, industry seems to be going along with DMS as a metals control organization to contact in Washington in event of more national emergencies.

It seems that most industries are glad to report sales and production figures to the government but are somewhat hesitant to do so with trade associations. Anyway, the government knows the capacity of each plant and in an emergency could have these figures available immediately. Having national sales figures available to gage prospects and trends and even foreign, military and civilian requirements on a year by year basis, could give industry a useful yard stick.

NEWS

from page 5

FLYING WELDOR Buddy Anthonson commutes daily between Peru and Ithaca, N. Y., in his own private plane

A DRESSY EXHIBIT in the Public Museum, Grand Rapids, Mich., is maintained by Aladdin Rod & Flux Mfg. Co.

Airline Weldor Flies To Work Every Day

MARTIN E. "Buddy" Anthonson, 38-year-old chief weldor for Mohawk Airlines Inc., Ithaca, N. Y., flies his own small airplane to and from work from Peru, N. Y. every day. He operates his own small aircraft repair base and his own 1500-ft landing strip and hangar at Peru. Buddy, his wife Hester, and three sons, aged 9, 11 and 12 live in the airplane hangar's unused space, which they have converted into a modern home complete with paneled walls and a deep freeze unit.

He does all welding work on Mohawk's fleet of 10 DC-3 aircraft with a 200-amp arc welder and an oxy-acetylene welding outfit. A licensed aircraft and engine mechanic, he has also worked for the Seneca Flying School at Syracuse, N. Y. and at Air Cooled Motors, also at Syracuse. Having logged some 2,500 hours in the air, Buddy has flown all segments of the Mohawk route between New York City, Albany, Utica, Rome, Watertown, Syracuse, Rochester, Buffalo and Niagara Falls.

One of the many valuable tasks Buddy has performed for Mohawk includes a milling re-facer for the filler necks on aircraft fuel tanks. These necks are worn and gouged by contact with refueling hose nozzles so that there is a danger of leakage around the tank cap.

This is very serious on an airplane, making possible a fire or dilution of the gas with water or dirt that might stop an engine in the air. Replacing these filler necks formerly took 33 hours, 25 to remove and replace the tank and 8 hours to fix the neck.

At the suggestion of Mohawk's crew chief, Charles Folsom, Buddy went to work on the possibility of re-facing the neck with the tank in the airplane. He came up with a tool that did the job in less than an hour. His re-facer consists of five components, a milling bit and driveshaft, an air-driven motor, a threaded center shaft, a securing plate and a gage with three leveling points. The air motor is used because of the possibility of electric sparks igniting fumes from the gas tank.

The securing plate is fixed in the filler neck by four alignment bolts so that the milling bit is on the neck surface. Turning at 1,500 rpm the bit remachines the neck contour. Two oil-covered plates below the milling bit catch all metal chips that might end up in the tank. It took Buddy just 16 hours to make the re-facer and his materials cost only $4. The job drew the praises of E. A. Butterfield, Mohawk maintenance superintendent, who describes Buddy as one of his best workers.

* * *

Nickel Short for Electrode Coatings

SEVERAL arc welding electrode manufacturers are very short of nickel powder used in the coatings of 230 and 260 low-hydrogen electrodes. Their suppliers, the powder processors, first have to buy the nickel in shot or pellet form. They then grind it into powder for the electrode manufacturers.

For some time, the processor submitted a melt sheet to NPA for the amount of nickel it wanted and identified its end use as a welding rod ingredient. But, allotments all along the line, including those to steel mills, were cut 10% for the second quarter of 1953. All interim applications were denied. Military sources increased their requirements and the amount going into the national stock pile was also increased 10%.

The only alternative the processors have is to go back to their military contracting officer. He can in turn make formal application to DMS for assistance.

* * *

Nickel Allocations Go On Monthly Timetable

ALLOCATION of nickel from now on will be on a monthly basis, instead of quarterly. With the issuance of an amendment to Direction 1 to Order M-80 and the changeover from the controlled materials plan to the Defense Materials System, the metal should be allocated with more flexibility.

This doesn't mean any increase in the supply, of course, but it should offer a better means of rationing what there is.

Allocations of cobalt, molybdenum, columbium and tantalum will continue on a quarterly basis.

* * *

(More New Products on page 76)

no matter how much you spend you cannot buy finer regulators than National

AND—here is a listing of the exclusive advantages they offer you:

1. Manufactured by an organization which has been in the welding and welding equipment business for over 40 years — whose original owners and operators own and operate the company today.

2. All major parts are automatically machined from uniform bar stock which assures complete concentricity and, thereby, absolute uniformity. Nothing is rounder than a round bar — and nothing offers greater production uniformity and strength.

3. A fully sealed — nylon bearing — tension screw assembly for effortless, long lasting — silken smooth operation.

4. Self-reseating relief valves which are tamper proof, reliable and sturdy.

5. A patented feature permitting instant change from hand set to a pre-set.

6. Both high and low pressure reduction stages are pressure adjustable.

7. The nylon button takes end-friction out of the tension screw.

8. An efficient inlet filter, with renewable cartridge, is easily replaceable without total disassembly of parts or removal from regulator body.

9. A seat mechanism and seat material which gives longer and more pressure accurate regulator life — which keeps the regulator on the job rather than in the repair shop.

10. Metal diaphragms which are neither too large nor too little and which have been designed for long life and freedom from trouble.

11. Short, properly designed and made tension springs which neither buckle nor bind in service.

528

Made by National SINCE 1910 WELDING EQUIPMENT CO., San Francisco 5, California

...after
nine years
steady use

practically
no
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expense...

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This torch is one of a number of this type in use in our straightening department and we can state without reservation that all have given exceptional service at practically no maintenance expense except for tip replacement.

Very truly yours,

STANDARD STEEL TREATING CO.

James D. Thompson

James D. Thompson, Gen. Mgr.

JDT:mg

To the advantages named in Mr. Thompson's unsolicited letter, important as they are, we must add another that might not be obvious to those who have never used a Harris Automatic Torch. That is, in nine years of continuous operation the thumb control lever (circled at right) must have been actuated many thousands of times. Each and every time it saved money. Using it to restore the full flame from pilot light eliminates the time, motions and gases wasted in flame adjustment of a standard torch. Using the thumb control to shut off the full flame saves oxygen and acetylene that is wasted when the full flame burns but is not applied to work. All these things combine to yield a tremendous return on torch investment.

Harris Distributors, located in all principal Cities, are at your service. There's no better time than now to act!

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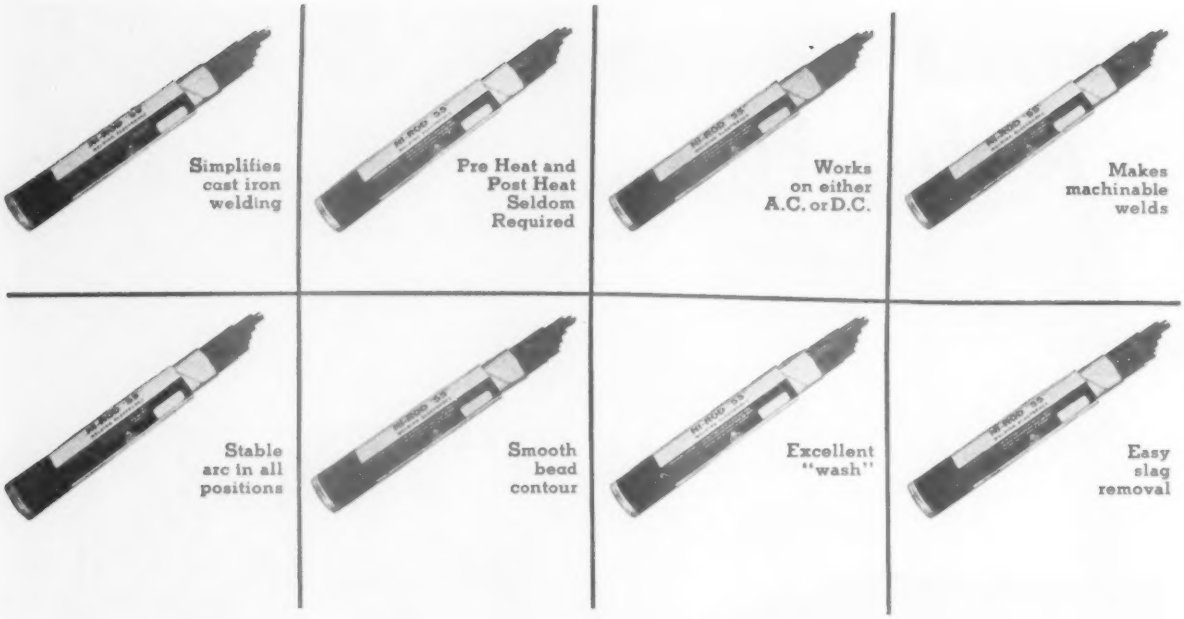
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Consult your Distributor of Ni-Rod "55"® electrodes for the latest information on deliveries. Remember, too—it always helps to anticipate your requirements well in advance, because nickel is needed for many vital defense uses.

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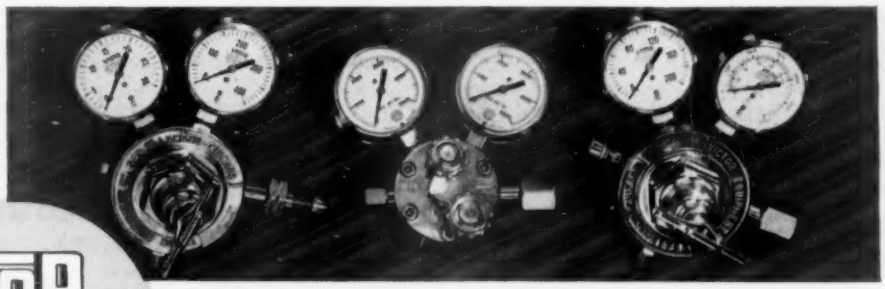

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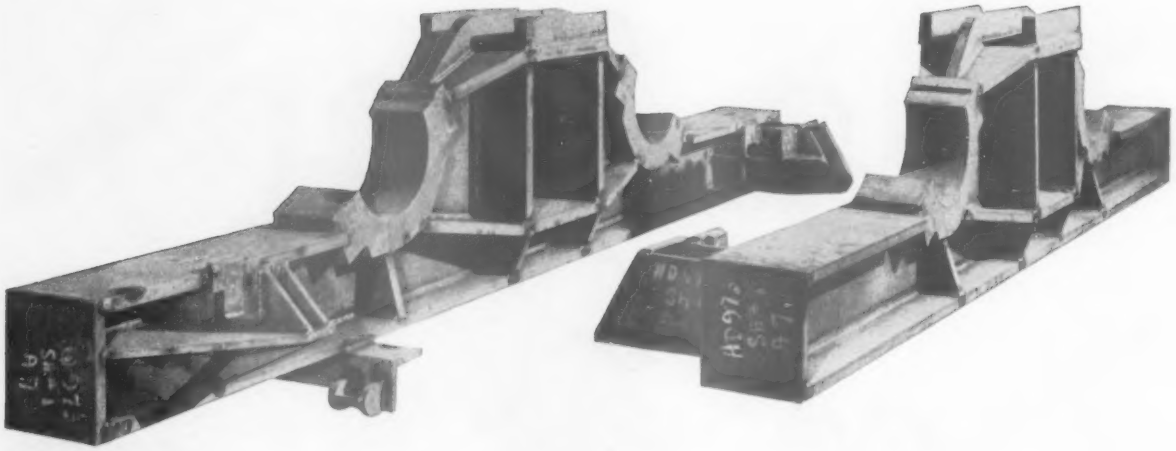


Side Frames for Ore Car Made by Welding

WEIGHT: 2624 LB EACH

These complicated parts are side frames for an ore-transfer car. The two side frames, shown from front and rear, are identical. They are 12 ft, 6 in. long; 2 ft, 10 in. high; and 2 ft wide. They were made by welding sections of plate steel, in varying thicknesses, in Bethlehem's Weldments Shop.

If you are a manufacturer of simple or complicated machinery, or machine parts, chances are good that you can profit through these advantages of Bethlehem Weldments:

4 BIG ADVANTAGES OF BETHLEHEM WELDMENTS

1. ECONOMY. With Bethlehem Weldments, excess weight is eliminated, without sacrificing rigidity. Nine times out of ten, a reduction in weight means a lower manufacturing cost for your product.

2. VERSATILITY. Bethlehem Weldments can be made in unlimited sizes and shapes. They can be used either as simple parts, or as sections of assemblies.

3. FREEDOM OF DESIGN. These weldments can be made in practically any design, as the steel can be bent, pressed or shaped in advance of welding, without harm to its physical structure.

4. VARIED USES. While Bethlehem Weldments are frequently used alone, they can also be combined effectively with forgings or castings.

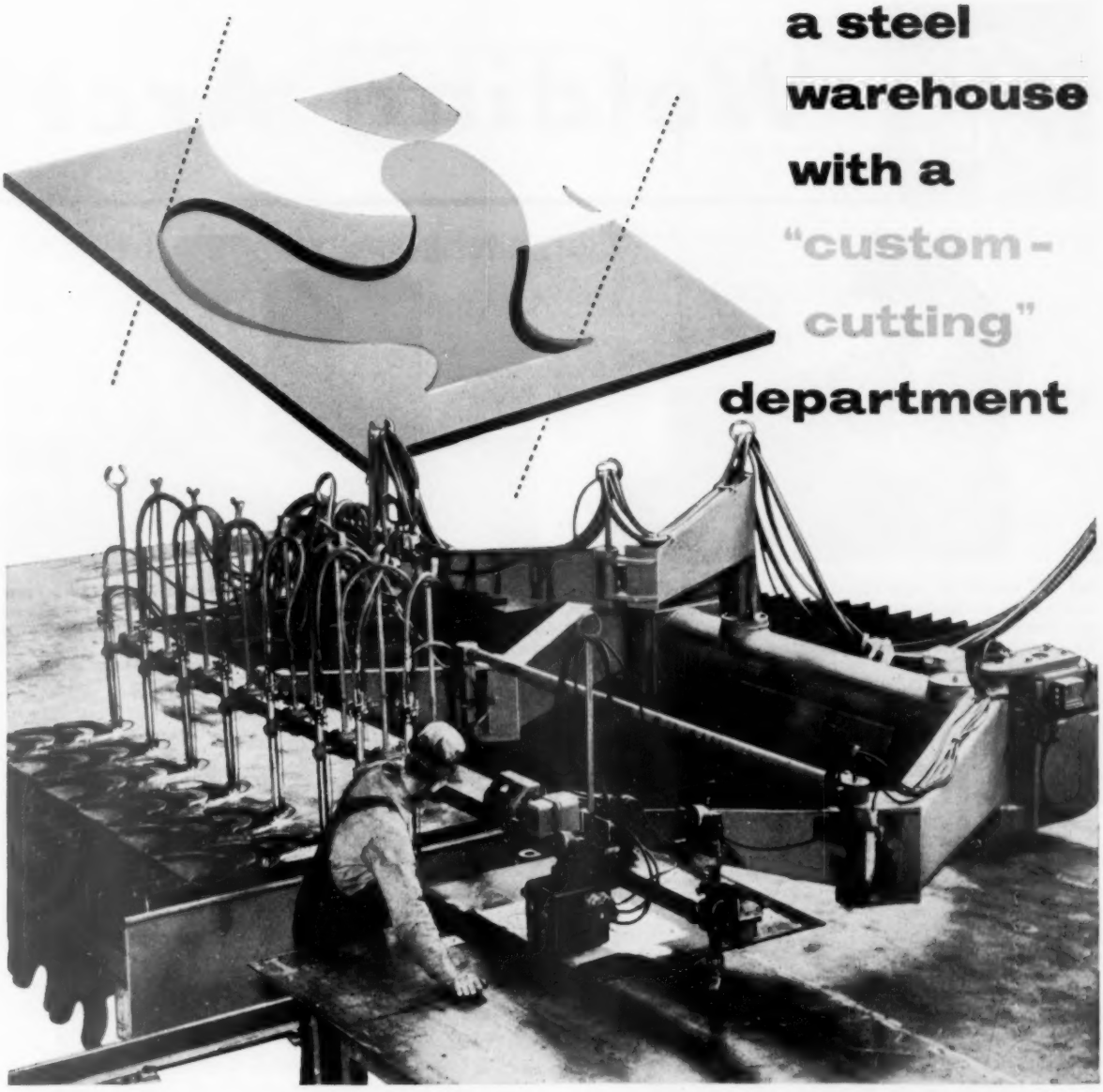
If you would like to discuss ways in which you can put weldments to profitable use, get in touch with the nearest Bethlehem office.

BETHLEHEM STEEL COMPANY
BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation. *Export Distributor:* Bethlehem Steel Export Corporation

BETHLEHEM STEEL

BETHLEHEM WELDMENTS



a steel warehouse with a "custom-cutting" department

That's McCormick Steel of Houston, Texas! By installing an Airco No. 50 multi-torch cutting machine, they've boosted steel orders with an entirely new type of service . . .

Here's how it works: customers supply an outline drawing or paper cutout of the required part. An "electronic eye" traces the guide with hairline accuracy. Irregular shapes, inside and outside square corners, obtuse angles, slim slots and intricate contours — the Airco No. 50 Travograph takes 'em all in stride. Circles up to 12 feet in diameter — thicknesses up to 6 inches! By keeping all 8 torches in operation, McCormick mass produces intricate shapes so accurately that further machining is, in most cases, unnecessary.

The Airco No. 50 Travograph cuts light plates, heavy slabs, billets or forgings . . . to minute tolerances . . . with virtually no limit on shape or size. Complete details are available by contacting your nearest Airco office.

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Welding Arcs

G-E MG WELDERS—half the size of other d-c welders of this type—offer a steady-arc interactor, single-dial dual control, easy inspection, wide current range, and high efficiency, for high production, operator satisfaction, low operating costs.

G-E AC WELDERS—best for 3 out of 4 jobs because of no arc blow—feature instant arc striking, steady capacitor-stabilized arc, exact current setting on the easy-to-read scale, high power factor for low-cost operation, and long-life silicone insulation.

FOR AC OR DC

Top performance, low over-all cost make G-E welders your best buy

G-E ENGINE-DRIVEN WELDERS—5 rugged types for every outdoor job—are powered by leading air- and liquid-cooled gasoline engines and diesels. Sturdily built to stand up in outdoor service, these units provide excellent welding performance.

Whatever the requirements of your welding job—whether it's AC or DC, indoors or outdoors—there's a General Electric welder available to give you unsurpassed performance. The features and operating benefits listed on this page can mean real savings for you during the long life of your G-E equipment.

You get more than just quality equipment when you buy G.E. Prompt shipment, application help, and complete service facilities provided by your local G-E Welding Distributor mean extra dollar savings for you.

For complete information on G-E welders and how they can help you do a better job at lower cost, contact your nearest G-E Welding Distributor today. He's listed here and in the classified section of your phone book under "Welding Equipment". General Electric Company, Schenectady 5, New York. 710-5

You can put your confidence in—

GENERAL ELECTRIC

News

Information on equipment, electrodes and accessories from G.E., pioneer in arc welding

New G-E electrode nomenclature will simplify selection, stocking, training

To simplify electrode selection, stocking, and training, which have been complicated by the large variety of electrodes manufactured today, General Electric has put into effect a new mild-steel and low-alloy electrode nomenclature system. This new system, closely tied to familiar AWS classifications, can be explained by a simple example:

The G-E electrode formerly known as W-28 is an AWS Class E-6012 electrode. Under the new G-E system, this electrode will be known as W-612A, formed by adding "W" to the basic 6012 and, for simplicity, dropping the "0". The "A" is used to differentiate between this electrode and two other Class E-6012 electrodes (formerly W-29 and W-20F) which will now be termed W-612B and W-612C. All other G-E mild-steel and low-alloy electrodes will be designated in a like manner.

During changeover to the new system, G-E electrode packages will carry both old and new numbers. Nomenclature of G-E stainless-steel and hard-surfacing electrodes will not be altered.

To familiarize yourself with the new G-E electrode nomenclature, ask your G-E Welding Distributor for a copy of GED-1634A.

Copyright 1953, G.E. Company

Joe Magee says . . .

New W-610A electrodes reported 8 ways better

User reports on General Electric's new W-610A electrode list 8 performance benefits of this outstanding Class E-6010 rod.

They say W-610A . . .

- is easier, faster to use
- is free of "wandering arc"
- eliminates pinholing problems
- produces lower-porosity welds
- stops "fingernailing"
- has a stable coating
- prevents excessive spatter
- makes slag removal easy

Find out for yourself

If you haven't discovered these benefits for yourself, contact your General Electric Welding Distributor today. He'll give you a free sample of G-E Type W-610A—the electrode that's fast becoming the quality standard for the welding industry.

FREE

Stainless-steel Guide

If you weld stainless steel, you'll want this new G-E Bulletin "Welding and Metallurgical Aspects of Stainless Steels". Written for both the novice and veteran weldor, this easy-to-read pamphlet is full of practical data to help you select electrodes, produce better welds, and avoid common problems in stainless-steel work. Ask your G-E Welding Distributor for Bulletin GET-1955.

Here's the name of your G-E Welding Distributor—

Alabama: Birmingham—Alabama Oxygen, Young & Vann Supply; Mobile—Turner Supply

Arizona: Phoenix—Consolidated Welding Supply

California: Fresno, Los Angeles, Oakland, Sacramento, San Diego, San Francisco, Ventura—Victor Equipment

Colorado: Boulder, Colorado Springs, Denver, Durango, Ft. Collins, Ft. Morgan, Greeley, LaJunta, Longmont, Pueblo—Hendrie & Bolthoff

Florida: Hollywood, Miami—Florida Gas & Chemical

Georgia: Atlanta, Macon—Welding Supply & Service; Augusta—Marks Oxygen; Columbus—Williams Welding Supplies

Idaho: Boise—Olson Manufacturing

Illinois: Chicago, Moline, Morton—Machinery & Welder

Indiana: Evansville—Drill Master Supply; Ft. Wayne, Indianapolis—Sutton-Garten; South Bend—Perry Welding Sales & Service

Iowa: Des Moines—Machinery & Welder

Kansas: Coffeyville—Thompson Bros. Supply & Welding Equip.; Hutchinson—Kopper Supply

Kentucky: Louisville—Reliable Welding; Paducah—Henry A. Petter Supply

Louisiana: Alexandria, Shreveport—Hughes Oxygen; New Orleans—Consolidated Welding Supplies

Maryland: Baltimore—Arcway Equipment

Massachusetts: Boston—New England G-E Welding Sales Division

Michigan: Detroit—Welding Sales & Engineering; Grand Rapids—Miller Welding Supply

Minnesota: Duluth—W.P.&R.S. Mars; St. Paul—Production Materials

Mississippi: Jackson—Jackson Welding & Supply

Missouri: Kansas City—Hohenschild Welders Supply; St. Louis—Machinery & Welder

Montana: Billings—Valley Welders Supply; Butte, Great Falls—Montana Hardware

Nebraska: Lincoln—Lincoln Welding & Supply; Omaha—Baum Iron

New Jersey: Kenilworth—Welding Sales

New Mexico: Albuquerque—Industrial Supply Co., Hobbs—Western Oxygen; Las Cruces, Silver City—Car Parts Depot, Inc.

New York: Buffalo—Welding Equipment Sales; Syracuse—Welding Engineering & Equip.

North Carolina: Charlotte—Dixie Gases; Gastonia—Gastonia Motor Parts

North Dakota: Bismarck, Fargo—Acme Welding Supply; Fargo—Dakota Electric Supply

Ohio: Akron, Cincinnati, Cleveland, Columbus, Dayton, Mansfield—Burdett Oxygen; Toledo—Odland Iron Works

Oklahoma: Tulsa—G-E Welding Sales Division

Oregon: Eugene, Portland—J. E. Haseltine; Medford, Portland—Industrial Air Products

Pennsylvania: Philadelphia, Pittsburgh—Arcway Equipment

South Carolina: Columbia, Greenville—Welding Gas Products

South Dakota: Deadwood—Hendrie & Bolthoff

Tennessee: Chattanooga, Knoxville, Nashville—Welding Gas Products; Memphis—Delta Oxygen

Texas: Abilene—M&M Welding Supply; Alice, Corpus Christi—Crane Welding Supply; Alpine, El Paso, Marfa, Pecos—Car Parts Depot; Amarillo—Tex-Air Gas; Brownsville, Harlingen—Acetylene Oxygen; Dallas—Hill Equipment & Supply; Hereford—Tex-Air Gas; Houston—G-E Welding Sales Division; Lubbock—Welders Supply of Lubbock, Midland—West Texas Welders Supply; Odessa, Pecos—Western Oxygen; Plainview—Plains Welding Supply; San Angelo—Southwestern Welding Supply; Snyder—Western Welding Supply; Texarkana—Hughes Oxygen; Wichita Falls—Nortex Welding Supply

Utah: Salt Lake City—The Galigher Co.

Washington: Seattle, Spokane—J. E. Haseltine; Spokane, Yakima—Industrial Air Products

West Virginia: Bluefield—Bluefield Supply; Charleston—Virginian Electric; Huntington, Logan—Logan-Hardware & Supply

Wisconsin: Milwaukee—Machinery & Welder

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Canada: Toronto—Canadian G.E.

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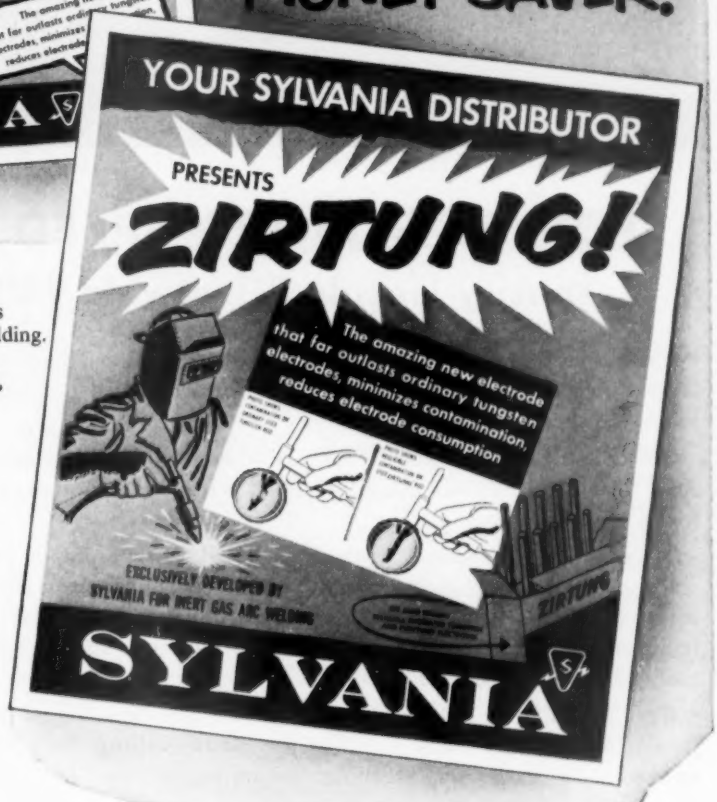
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Zirtung operates on the same current range as thoriated tungsten. Contains no radio-active material. Wonderful for welding stainless and mild steels, aluminum, and magnesium. For further details, call your nearest Sylvania Welding Distributor or write to: Sylvania Electric Products Inc., Dept. 3T-4307, 1740 Broadway, New York 19, N. Y.

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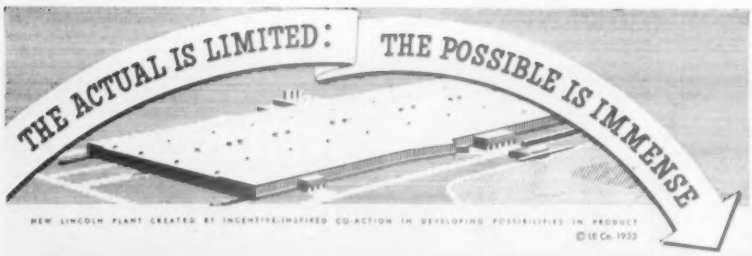

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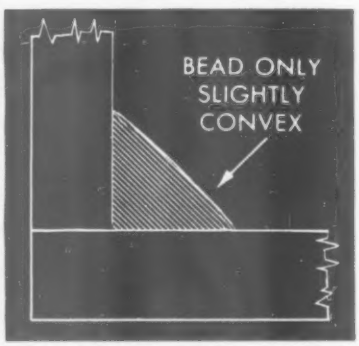

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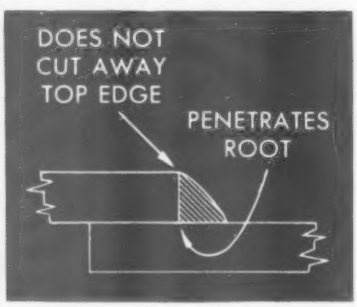

Fig. 2. Quality at Top Speed. *Proper penetration at root is done without cutting away top edge.*

ESTABLISHED 1916 THE WELDING ENGINEER JULY, 1953

Dependence Day Declaration

A NEW CROP of potential young employees is again being turned out of our schools. Some of them have jobs waiting for them in the armed services, but eventually they will be allowed to enter the business world. When they go out job-hunting, what are the questions that they will be asking of a prospective employer?

They are looking for security. A young man in his early twenties will ask, "What kind of a retirement plan do you have?" He is vitally concerned with retirement, even though it may be 40 years away in time. Occasionally, an applicant will ask what the job is and what will be expected of him, but such questions are definitely not in fashion. Most of the present crop seems to look upon the corporation that is hiring them as a sort of glorified cow, from whose kindly teats they can draw sustenance forever.

Times certainly have changed. It used to be that Americans sought freedom of action, freedom to work and save, freedom of opportunity and freedom to think. The Fourth of July effectively symbolizes these freedoms. Now most of them seem to have been forgotten, and Independence Day has dwindled to an excuse for spending a three-day week-end driving over packed highways.

HAD OUR forefathers been as worried about security as the youth of today, there never would have been a United States of America. They wouldn't have risked signing the Declaration of Independence and so we would have stayed a British Colony forever. Or, to go further back, had the Pilgrims placed security first, they certainly would not have been such fools as to leave the Old World. Why risk Indians and a wilderness for a chance to worship the way you want to? Save your hide by staying at home and worshipping as they tell you to.

The Puritans, being a peculiar breed of people (almost as extinct as the dodo), thought otherwise. They thought that freedom of conscience was vastly more important than security. How times have changed!

It is our great good fortune that the Pilgrim Fathers crossed the ocean and that the signers of the Declaration of Independence were courageous and willing to risk all that they had. Their long shot paid off, and a great industrial republic came into existence. But how much longer will it be permitted to endure?

WE ALL know that Communists and their allies are plotting against America, but there is another plot which, I think, is vastly more dangerous. A plot to strike out the "In" from "Independence" and bring a "Declaration of Dependence" into being. A plot to abolish the traditional American virtue of self-reliance.

I think that today's over-emphasis on security is cut from that piece of cloth. Set a man to thinking about retirement plans, instead of what he can produce by his own efforts, and you've rotted his manhood. Instead of a self-reliant human being able to stand on his own two feet and look the world in the eye, you've created a dependent. Create enough dependents, and you can scare them into granting you unlimited political power. The plot against America may be basically that simple.

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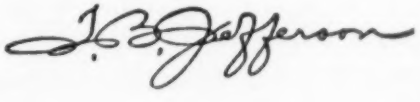

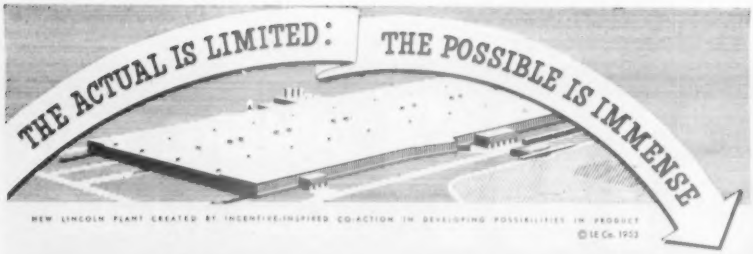

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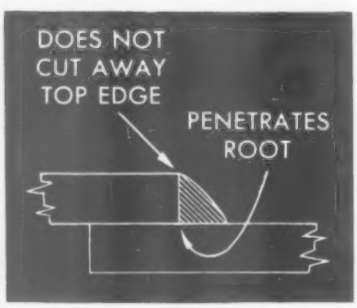

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ESTABLISHED 1916

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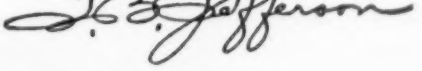
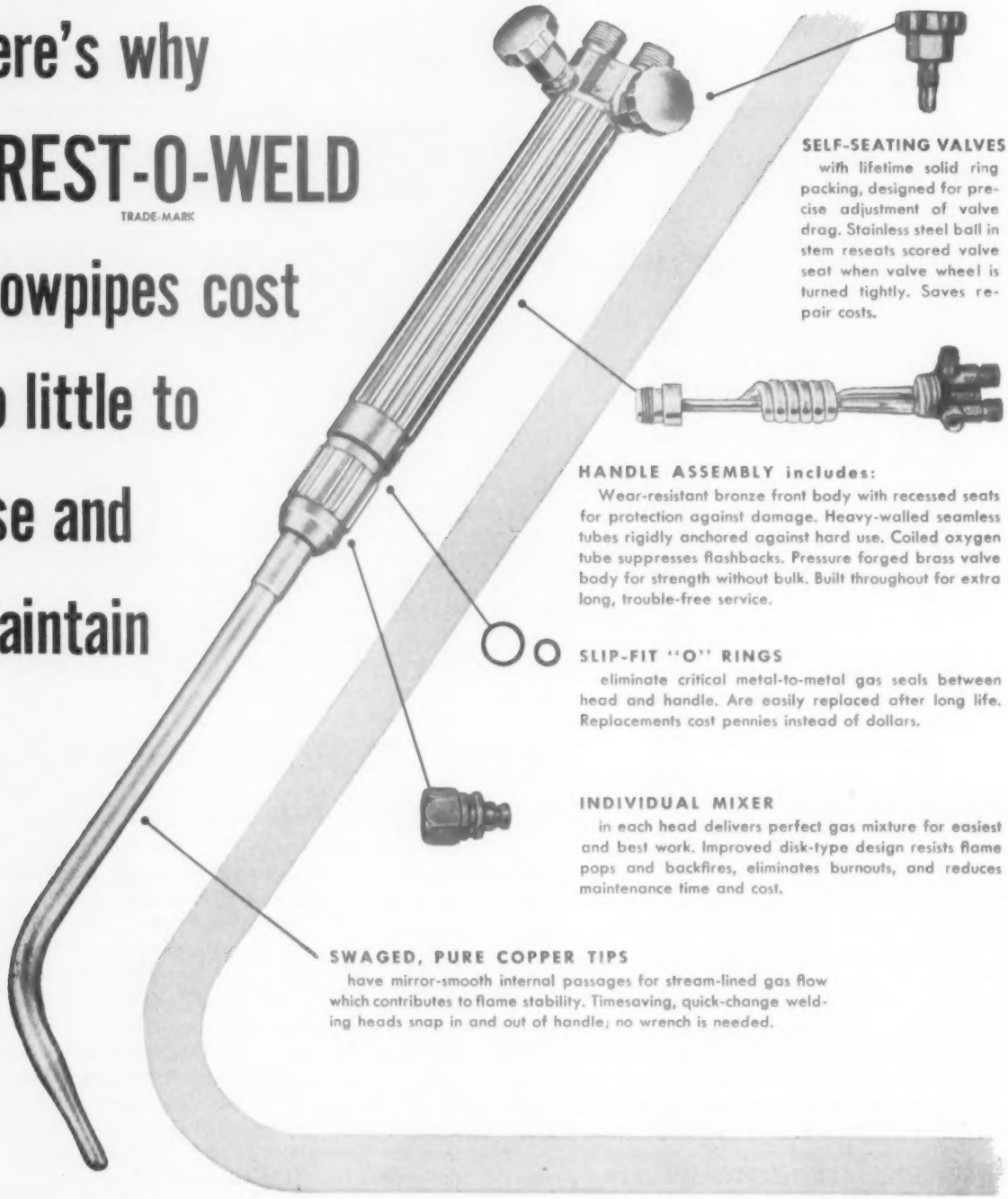


Here's why PREST-O-WELD TRADE-MARK Blowpipes cost so little to use and maintain



SELF-SEATING VALVES with lifetime solid ring packing, designed for precise adjustment of valve drag. Stainless steel ball in stem reseats scored valve seat when valve wheel is turned tightly. Saves repair costs.

HANDLE ASSEMBLY includes: Wear-resistant bronze front body with recessed seats for protection against damage. Heavy-walled seamless tubes rigidly anchored against hard use. Coiled oxygen tube suppresses flashbacks. Pressure forged brass valve body for strength without bulk. Built throughout for extra long, trouble-free service.

SLIP-FIT "O" RINGS eliminate critical metal-to-metal gas seals between head and handle. Are easily replaced after long life. Replacements cost pennies instead of dollars.

INDIVIDUAL MIXER in each head delivers perfect gas mixture for easiest and best work. Improved disk-type design resists flame pops and backfires, eliminates burnouts, and reduces maintenance time and cost.

SWAGED, PURE COPPER TIPS have mirror-smooth internal passages for stream-lined gas flow which contributes to flame stability. Timesaving, quick-change welding heads snap in and out of handle; no wrench is needed.

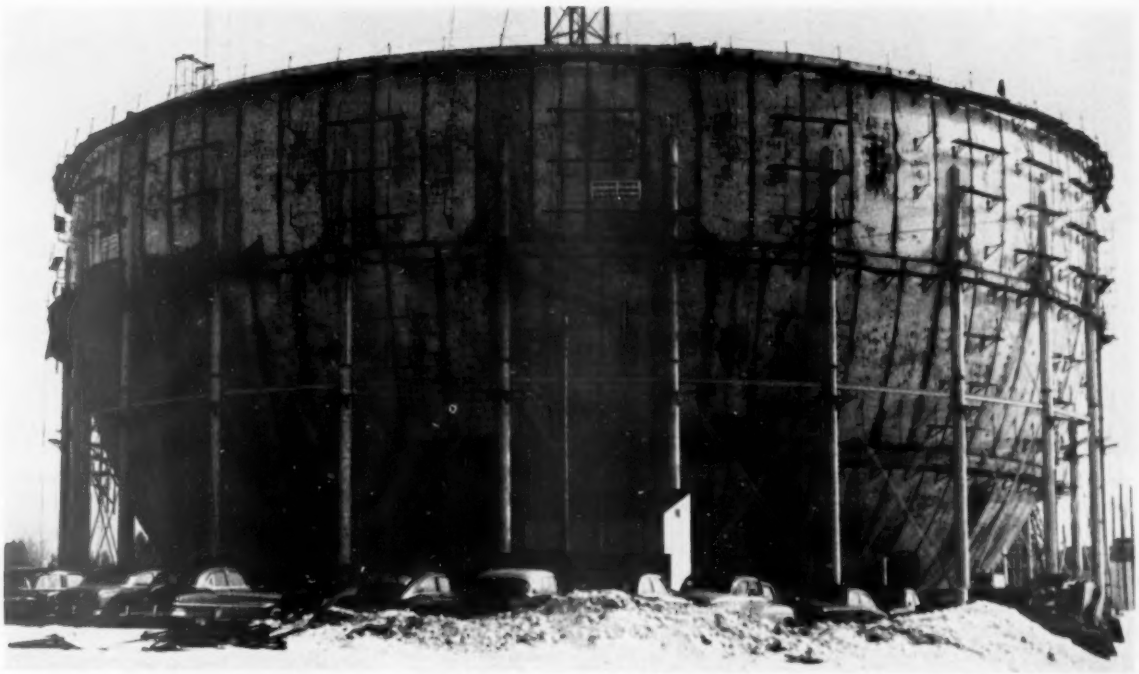
The PREST-O-WELD W-122 Blowpipe (illustrated) is for all-purpose welding and heating of any metal from 32-ga. sheet to plate or castings 1 in. and over in thickness. Available with your choice of standard welding heads in 13 sizes and multiflame heating heads in 3 sizes, all of the snap-in type. All heads have an amazing resistance to flashbacks, flame pops, backfires, and burnouts. Ask your jobber for a demonstration now, or for further information, write to LINDE AIR PRODUCTS COMPANY, a Division of Union Carbide and Carbon Corporation, 30 East 42nd Street, New York 17, N. Y.

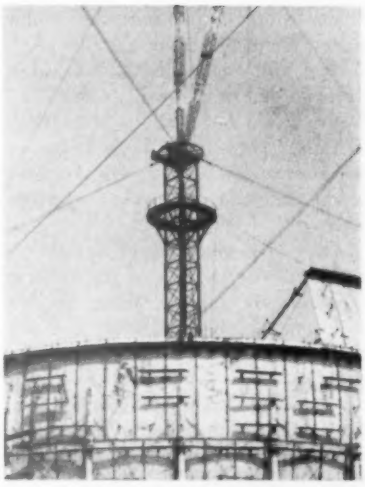
GET IT FROM YOUR

LINDE

JOBBER

"Prest-O-Weld" is a registered trade-mark of Union Carbide and Carbon Corporation.





1—TOP: Ring of pipe columns 73 ft 6 in. high supports the big sphere
2—CENTER: Erection derrick towered 420 ft above sphere's foundation
3—BOTTOM: Derrick was anchored in the crater below bottom of sphere

Atom Apple

(See front cover)

This truly giant sphere is 225 ft in diameter and has 26 times the volume of its nearest competitor. It will hold a submarine that will never go to sea.

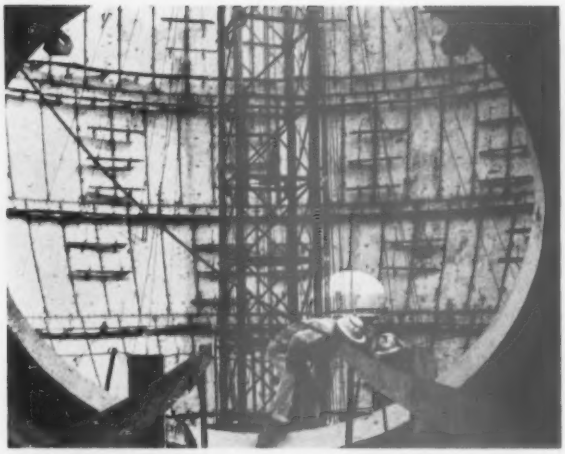
BY HERMAN C. PHELPS

IF YOU are a weldor who would also like to become an aerial performer, we know where you could have got paid for your tryout performance. The place is West Milton, N. Y., just 18 miles from Schenectady, where there has been erected the largest steel ball man ever built—225 ft in diameter.

This giant sphere has a volume 26 times that of its nearest competitor. It is known as a "Hortonsphere," a name derived from the late George T. Horton, the original designer, who was president of Chicago Bridge and Iron Co. from 1912 to 1945. The super Hortonsphere was also designed by a Chicago Bridge man, Clifford M. Orr, of the research department.

When completed, the sphere will hold the prototype of a new atomic-energy submarine propulsion unit, contained in a complete section of a submarine hull. Besides housing the nuclear power plant, the sphere constitutes another safety precaution. There could not possibly be a bomb-like explosion, even though all of the numerous safety devices should fail to operate, but some radioactive fission products might be released, and these would be confined inside. The spherical shape was selected because it provides the necessary volume at the lowest cost of construction.

The actual atomic reactor will use liquid sodium metal (which melts at just below the boiling point of water) to carry the heat to the boiler. Steam will be generated, and this



4—INTERIOR from one of the "locks" (access openings), which became grade-level entrances to sphere

5—TRUNNION-mounted jigs help keep welding head in level position while following the curved contour

will power the turbine-generator that produces electricity for the submarine's propulsion motors.

Building the king-size Hortonsphere for the Atomic Energy Commission was a $2,146,000 job. The contract was awarded to Chicago Bridge and Iron Co., with General Electric Company administering the contract. The submarine power plant was designed and fabricated by Electric Boat Co., a division of General Dynamics Corp., New London, Conn. Chicago Bridge and Iron Co. erected the hull under subcontract to Electric Boat Co. The entire undertaking was developed by the Knolls Atomic Power Laboratory, under Manager J. D. Anderson of the Schenectady Operations office of the Atomic Energy Commission.

Welding on the sphere started Oct. 1, 1952. Its completion was scheduled for July, 1953. Altogether, there were to be 25,000 ft of welding on the sphere. The longest continuous welding beads are the two just above and below the equator; these will each be 706 ft in circumference. They are believed to be the longest continuous beads ever attempted.

Pipe Columns Support It

The erection and procedures of construction of the ball are unique. There are no structural members such as I-beams, trusses or spars inside. Instead the sphere is entirely supported from the outside by 26 pipe columns (photo 1). These are designed to hold an expected dead load of 260 kips* and a bracket load of 327 kips, which will include dead load, wind and snow. The columns are each 73 ft 6 in. high and 24 in. in diameter; they are cut to their intersections and welded throughout their 18-ft point of contact. The "equator plates" are welded to the columns on the outer perimeter. This is made possible by the fact that the sphere is sunk deeply below ground.

*1 Kip = 1,000 lb per sq in.

The foundation for the sphere is a giant saucer of concrete, 180 ft in diameter and 42 ft deep. At its center was the erection derrick and tower (photo 2), extending 420 ft above its foundation in the bottom of the saucer. The derrick was anchored at the center of the bottom of the crater or pod, as shown in photo 3. As construction proceeded, the floor of the sphere was filled to grade level with crushed rock and a 3-ft concrete slab was poured over that. The 4-ft curved area between the shell and the earth crater was filled with concrete when all the welding and actual construction on the ball had been completed. As the floor level of the sphere was filled to grade level, the space between it and the crater was concreted at the same rate of rise to avoid any distortion to the big ball.

Two locks or access openings (photo 4) were provided at grade level for general construction and operation. The intersection of the locks and the sphere required heavy reinforcing rings, weighing about 12 tons each, together with smaller spheres 16 ft 6 in. in diameter. The doors were built into special bulkheads fitting these smaller spheres and were made pressuretight by gaskets.

Rigid Welding Requirements

This is probably the first sphere erected that has to meet such rigid specifications and requirements. All welding had to conform to requirements more rigid than the boiler codes. Welds had to have 100% penetration; all welds had to be radiographed and only low-hydrogen electrodes could be used. In plain English, the sphere must be a foolproof pressure vessel. More will be told about electrodes and weld inspection later on.

The steel plates were spaced in checkerboard fashion in the vertical position. By placing them in this manner, the vertical welds did not cross circumferential welds. The circular seams were made radial or open joint. No circumferential welds ever went past an unwelded vertical; the vertical seams were all completed first.

First, the equator course was erected. The successive courses were erected below the equator course until the bottom half of the sphere was complete except for a closure piece (photo 3). Finally, the courses above the equator were erected. Pipe braces supported individual panels until a complete course had been erected and welded together and to the course below.

All told, there were 3,850 tons of steel plate used in the construction of the Hortonsphere. All plate is ASM A201 grade B firebox material, bought to A300 specification for —50 F and cold formed to double curvature in the Chicago Bridge and Iron shops at Greenville, Pa. Plate edges

6—MAN at right is preheating with a propane torch while man at left gets the flux-recovery hose ready

7—WELDING head is tandem or dual-arc. Man with hose follows the machine to gather up the used flux

were ground to a 30-deg bevel, leaving a ¼-in. land at the weld root. The plates were then transported to West Milton by railroad flat cars.

Each plate weighs about six tons and measures 9 ft wide by 32 ft long. The plate varies in thickness; the heaviest plate, 1.02 in. thick, was installed at the equator. From the equator, plate thickness tapers off to 0.90 in. at the bottom and 0.90 in. at the top.

Making Plate Panels

Four plates were butt welded together before erection to form a panel 36 by 32 ft. This welding of curved surfaces was done on a special contour leveling jig (photo 5) with a submerged-arc welding head. Photo 6 shows the starting point of automatic welding. The man at the right is preheating the plate with a propane torch while his companion at the left gets a flux-recovery hose ready. The welding head is tandem or dual-arc (photo 7), with two reels of wire for feeding to the arcs. The erection scaffolding framework was welded to the plates before they were placed in position.

As the plate level went upward, the positioning of plates was aided by trussed-pipe struts, radiating from the derrick tower like the spokes of a wheel. Final top closing was to be made after the last section had been hoisted alongside the hole through which the tower would be projecting. Then the derrick was to be dismantled and removed through the grade level openings.

Better than 50% of all the welding was done manually after the usual 70 F preheat. In general, three passes were made on each side of the sphere, using 5/32-in. electrodes with machines set at 165 amp. Most of the welding cable leads were at least 350 ft long.

For wind breaks, weldors used asbestos curtains (photo 8), placed on the opposite side from that being welded. On the side being welded, plywood windbreaks were put up. These were not so much for protection from the elements (although it was darn cold when the photos were taken) as to keep the wind from blowing away the protective atmosphere exuded from the electrode coating. Without this atmosphere, the steel would oxidize as readily as if welded by bare electrodes.

The electrodes were of the low-hydrogen type (E-7015 and E-7016). Tests have shown that low-hydrogen electrodes are not so susceptible to underbead cracking. The welding filler metal itself is more dense and does not have anywhere near the amount of "fish eyes" ordinarily found in the E-6010 types.

Tested at 50 Below

The specific rods used were Navy-approved according to military specifications, which means that they met the fully restrained Navy patch or Charpy 15-lb impact test. Under this test, all specimens must be welded at zero Fahrenheit and tested at minus 50 F. Commercial rods are tested at minus 50 F, but the welding is done at room temperature.

The thousands of pounds of low-hydrogen electrodes needed for construction were packaged in sealed metal containers and stored in a heated room. To keep out moisture after the containers had been opened, the electrodes were stored in an oven held at 320 F.

18 Weldors in the Air

Under Superintendent Wendel Cobb were 22 men, all regular employees of the Chicago Bridge and Iron Co. and all weldors who were well acclimated to working in high places. Four were supervisors. Working at high elevation created no problem for the C. B. & I. men, but the case was otherwise with local weldors who applied for jobs and passed their qualifying tests on the ground. Very few of these men had ever picked up a stinger and struck an arc from a high, narrow scaffolding. You can see what they were up against when you look at the size of the men in the top of photo 8. And the sphere was only half completed at the time this picture was taken.

At present writing, there were no serious injuries; in fact, the safety record was excellent.

Rejects on manual welding were remarkably low for such rigid requirements. They averaged from ½ to 1%, a marvelous tribute to the weldors. Manual welding was even better than automatic welding—the automatic process averaged 2% rejects. And automatic machines were tested every week by running weld coupons and testing their performance.

All seams to be welded were pre-

8—INSIDE of shell shows the asbestos curtains that keep the shielding atmosphere from being blown away. Note the small size of men on top

heated to 70 F by propane-fired torches. This helped to produce better welds. The butt welds that join four plates together were each made in three passes. The first pass was made manually on the concave or inner side of the plates. It took care of any variance in joint fit-up or gap clearance and was held close to 3/16 in. The second pass, made with the tandem submerged-arc welding head, was on the outside—the opposite side from the manual weld. Two electrodes were used simultaneously, with current between 600 and 900 amp on each electrode. The dual-wire equipment (photo 7) filled each vee at a speed of 18 to 20 ipm. The third pass, also automatic, took out the manual weld by means of a high-amperage or deep-penetration adjustment. One whole day was required to weld one of the 32 by 36 ft panels.

Machine Kept Level

The automatic machine was always kept level at the point of welding to insure a uniform flow of deposit. This was done by two trunnion-mounted jigs, aided by a small winch.

The flux found most satisfactory was a mixture of two meshes. Used flux was recovered and strained so it could be used over. Flux was removed as soon as it was possible to lift it from the weld and surrounding area. The operators then examined the weld immediately for visual defects.

Every inch of welding was X-ray inspected according to the boiler codes. Altogether, there were expected to be 30,000 films at completion of erection, including 5,000 expected retakes. Welding inspection was carried on by Pittsburgh Testing Laboratory, Pittsburgh, Pa., with a 250-kv X-ray tube.

At completion of construction (but before the hull section is installed), all welds are to be bubble tested to detect leaks. During this test, the completed sphere is to be pressurized to approximately 20 psig, which will correspond to a membrane stress of 15,000 psi.

Rejected welds uncovered by X-ray were gouged out with arc-air torches (photo 9). These gouging tools, it was found, removed the deposit as well as the slag (photo 10). This is what the supervisors wanted as they contended that chipping merely covers up the defects. Sometimes as many as five arc-air tools were used at one time. They were also used to take off strongbacks and scaffolding framework no longer needed. According to Wendel Cobb, welding superintendent, this particular tool is a real boon to construction workers.

Access Openings

Two openings were scheduled to be flame-cut into the completed sphere. One of these will be a circular opening 21 ft 6 in. in diameter, to serve as an access opening for large pieces of equipment. The other will be about 32 ft wide and 36 ft high and will serve as an opening for moving the prototype hull into the completed sphere. This operation will require the removal of a pipe column (shifting its load to adjacent temporary columns) while the moving is in progress. During the cutting, care will be exercised to see that no cuts are made lengthwise through welding seams. The openings will permit the propulsion unit and other large equipment to be moved in from the outside. Before this work is done, reinforcing ribs will be installed so that distortion will be held to a minimum.

While on the subject of distortion, it might be appropriate to mention that the gap for fit-up between the last two plates installed at the 706-ft equator was less than 1/16 in. Add to this the fact that the circumference of the equatorial band was only $\frac{1}{2}$ in. off the theoretical, and you have positive proof that welding doesn't cause distortion—if it's done right!

9—WELDS rejected by X-ray are gouged out with an arc-air torch

10—GOUGING removes all of the old weld metal prior to rewelding

PANEL on sales effectiveness. Members are: Gordon Duff (whose name plate fell down), J. P. Coughlin, J. M. Robinson, R. G. Harrison and Roy W. Poe. Ralph Chase acted as the moderator. All of these men did a good job

Cincinnati: We Were There!

Few distributors will forget what took place at the Sheraton-Gibson Hotel. The ninth annual NWSA meeting was well planned, well run, stimulating and exciting.

BY HERMAN C. PHELPS

TO JUDGE from the remarks of Milt Sims, outgoing president of the National Welding Supply Association, the welding distributor is prepared to give a good account of himself in the future, whether general business be good or bad. That was one of the thoughts I carried away with me from the association's ninth annual convention at Cincinnati.

It was a well planned convention. Guest speakers were wisely chosen, and their subjects were of general interest. Attendance reached 395, slipping a trifle from the 401 who registered at last year's Chicago convention. NWSA membership, however, is increasing. During the year, it leaped from 314 to 391, with the addition of 53 active and 24 associate members.

Among convention events, the panel discussion on Tuesday forenoon proved particularly good. Excellent talks were made by the five panel members on the subjects of how to design displays for best results, how to train salesmen, how to select an incentive plan for salesmen, how to run sales meetings and how to use manufacturers' literature.

STAR SALESMAN PERFORMS

For this writer's money, however, the highlight of the whole meeting was the talk immediately after the panel by H. B. Sharer, sales training specialist of the U. S. Rubber Co., New York City, on the subject of "What Makes a Star Salesman a Star?" Sharer is not only a star salesman himself, but he also proved to be a combination of philosopher, magician and character actor. Everyone who heard this inspirational presentation came away a better salesman.

It is not enough for a salesman to know his product, implied Sharer. Thousands of order-takers may know their lines from A to Z but still lack the ability to sell. Sharer's philosophy is to make more calls, see more people and make more sales. "A salesman has three things to sell," he declared, "his products, his company and himself. The two things he must never discuss are—religion and himself!"

Actor-Philosopher-Salesman Sharer knows how to hold an audience. From the time he hung his microphone on his lapel until he removed it to show them his shirt, he had them rolling in the aisles. The shirt, it should be mentioned was one that a haberdasher had sold Sharer with the stipulation that the collar would wear forever. The collar did wear, but the rest of the shirt was in shreds by the

New NWSA Officers and Directors

President: William A. Rice, Virginia Welding Supply Co., Charleston, West Virginia

Vice-presidents:

Eastern zone: Robert G. Jackson, Jackson Welding Supply Co., Rochester, N. Y.

Southeastern zone: W. P. McLendon, Keenan Welding Supplies Co., Albany, Ga.

Southwestern zone: R. G. Harrison, Welders Supply Co., Little Rock, Ark.

Central zone: James N. Alcock, Saginaw Welding Supply Co., Saginaw, Mich.

West central zone: Marcel L. Lampton, Lampton Welding Supply Co., Wichita, Kansas

Western zone: J. Gordon Duff, Gordon Duff, Inc., Los Angeles, Calif.

Directors, terms expiring in 1956:

A. H. Homrighaus, Jr., Welder Service Co., Toledo, O.

George M. Avery, Scott-Foster, Ltd., Vancouver, Canada

Nolen E. Elam, Industrial Welding Supply Co., Houston, Texas

A. C. Axtell, Essex Welding Equipment Co., Newark, N. J.

To fill unexpired term of Marcel L. Lampton ending 1954:

H. H. Kaehn, Gopher Welding Supply Co., Rochester, Minn.

W. A. RICE, new president of the association, and his lovely wife

MILT SIMS, outgoing president, giving president's annual address

MAYOR Carl W. Rich made NWSA members feel welcome in Cincinnati

end of the talk. What a climax!

Interjecting a personal note, the writer will never forget the rib he took when he climbed upon the stage to shoot a picture. "For 15 years I've been doing a solo, and now you're trying to horn into the act!" Sorry, Mr. Sharer! I was only trying to get a picture of the crowd rolling in the aisles.

It Began on Sunday

Though held officially from Monday May 11 through Wednesday May 13, the convention actually began with registration on Sunday afternoon for those who felt like coming earlier and enjoying extra time to visit with their friends. A board of directors' meeting was also held on Sunday, followed by a dinner for directors only.

On Monday morning, the meeting was called to order by NWSA President G. Milton Sims. Sims, who is in private life president of the Absco Welding Supply Co., Los Angeles, said that business was good and healthy but conditions have turned toward a buyers' market. He was of the opinion that distributors should be ingenious enough to go out and get their share of business regardless of what the future may bring.

In reporting progress of National Welding Supply Association activities, Robert C. Fernley, secretary-treasurer, placed particular emphasis on the successful zone meetings that were held in Milwaukee, Philadelphia, Kansas City, Atlanta, Houston and San Francisco. Attendance at these meetings ranged from 88 to 175. The meetings were also gratifying from the standpoints of talks presented and discussions generated.

Also on the opening morning, H. F. Reinhard, secretary of the International Acetylene Association, spoke on safety in the welding industry. He was followed by Mayor Carl W. Rich, of the City of Cincinnati, whose entertaining remarks on how the city got its name, the Indian treaties and the local ball club were well received. Mayor Rich was most enthusiastic about the fact that the National Welding Society Association was returning to Cincinnati, where its fifth annual meeting was held. Cincinnati thus shares with Chicago the distinction of having entertained NWSA twice in its comparatively brief history.

Professor H. H. Maynard, College of Commerce and Administration, The Ohio State University, Columbus, gave some sage advice in his talk on sharpening the tools of wholesale management. "We grow so soon so old and so late so smart," quoted Maynard from a saying of the Pennsylvania Dutch. His observation that the manufacturer's cost of direct selling is proving prohibitive was well received—as one might expect.

The other activities of the first morning session included a report by Glenn Garman, chairman of the by-laws committee, on extensive revision of the association's constitution and by-laws.

Contact Booths

Monday and Tuesday afternoons were devoted to "contact boothing," now a well established feature of NWSA conventions. In these booths, some 72 manufacturers (associate members of the association) had sales literature with which to enlighten the distributors visiting them. The contact booths were well attended, and both distributors and manufacturers agreed that two afternoons were all too short a time. For future conventions, it might be wise to see if some arrangement could not be made to allot more time to this important part of the annual meeting.

The subject of contact booths leads us naturally to social activities, a side of the convention that was by no means neglected. The annual dinner on Tuesday evening was a most entertaining event. E. C. Caluwaert, O.K.I. Welding Supply Co., Cincinnati, did a good job as toastmaster, and a mind-reading act held the entire group spellbound. I wish someone would tell me how the lady knew so many things so quickly about so many people she had never seen before. Her dope was accurate, too.

The ladies who came to this convention had a good time of it. Besides attending the annual dinner with their husbands, they also went on a boat trip and to a canasta party.

Sales Panel Discussion

The second morning of the meeting was devoted essentially to selling. The session opened with a panel discussion on the general theme, "Increasing Sales Effectiveness." Ralph E. Chase, Chase Welding Supply Co., Benton, Ill., acted as moderator. Five members were allotted specific topics:

Layout and display: Gordon Duff, of Gordon Duff, Inc., Los Angeles.

Training of salesmen: J. P. Coughlin, Westinghouse Electric Corp., Buffalo, N. Y.

Compensation of salesmen: J. M. Robinson, Robinson Welding Supply Co., Detroit.

Sales meetings: R. G. Harrison, Welders Supply Co., Little Rock, Ark.

Use of sales promotion literature: Roy W. Poe, Tweco Products Co., Wichita, Kansas.

FRED KIEL, Federal Reserve of Cleveland, spoke on what's ahead

JIM ALCOCK delivers his report on plans of the catalog committee

R. P. TARBELL reports for the manufacturers' relations committee

Duff told how his company had planned a new store, laying special emphasis upon how decisions were reached to place various types of equipment so as to increase store sales.

Coughlin revealed how salesmen are trained at the Westinghouse factory. He said that Westinghouse distributors can now send men to the factory to receive either a two weeks' training program or a full three-months' course in welding.

Jim Robinson gave an interesting account of how he has established different categories in order to figure salesman's commissions. Category A represents items with a 5 to 19% profit margin, on which he pays a 2% commission to salesmen. Category B represents 20 to 29% profit items, on which 6% is paid to salesmen, and Category C represents items with 30% or more profit, on which 10% commission is paid.

His costs of doing business, Robinson admitted, are in the 18 to 22% category.

Harrison, the distributor from Little Rock, Ark., makes all of his salesmen take a course in public speaking. He also uses manufacturers' moving pictures—both on selling and on technical training—to good advantage in sales meetings. Last year these and other innovations paid off in a sales increase of 33 1/3%.

Last man on the panel to speak, Roy Poe, of Tweco Products, asserted that the major cause of poor sales was lack of sales ability. A distributor, he said, will spend $1,000 to improve a truck but nothing to improve his salesmen. Poe suggested that gross sales could be increased by getting full value from each man and full value out of manufacturers' literature and other sales aids. This would also cut sales costs. Poe pointed out that too much selling is done bare-handed; salesmen should show their products.

Though the panel discussion was excellent, it was overshadowed by the Sharer presentation of "What Makes a Star Salesman a Star," earlier discussed.

Looking Ahead

The third-day session had two talks: "Stock Control Methods We Are Using" by Harry Moore, Moore's Welding Supply, Sacramento, Calif., and "What's Ahead for Business" by Fred O. Kiel, senior economist of the Federal Reserve Bank, Cleveland.

Mr. Moore claims it is not necessarily suicide to divulge your methods of doing business to your competition. As an example, his own competitor has copied his inventory control system with excellent benefits to the customers of both concerns

Where we are and where we are going, as explained by Fred Kiel, made interesting food for thought.

Where we are: Our current business volume is terrific. All but one industry is enjoying record sales. At present there are 61,500,000 people working. The national income has reached a whopping $282,500,000,000.

Where we are going depends on: which way the international situation turns, what the government tax program will be, what the great mass of consumer purchasing power is going

(Continued on page 58)

CANADIAN visitors. The two men seated are, left to right: Charles (Dinny) Dinsmore, Dinsmore & Co. Ltd., Montreal, and Bill Renouf, representing Essex Welders Supply Ltd., Windsor, Ont. The five men standing are, left to right: George M. Cameron, of Alex. Latta Ltd., Edmonton, Alberta; Merv. Cozart, Welders Supplies Limited, Calgary, Alberta; Charlie Cane, Welders Supply Co., Toronto, Ont.; George Avery, Scott-Foster Ltd., Vancouver, British Columbia, and Alex Stuart, Essex Welders Supply, Windsor

1—"S" AND "C" scrolls welded to square tubing—the start of a porch post of ornamental ironwork

2—TWO scrolls at right angles to each other, when welded to a common tube, make a corner post

3—TRY a filler rod with electrode to build up low spots in a hurry on the cast-iron components

Ironwork Just Like New

BY T. B. JEFFERSON

WITH the passing of the blacksmith, the making of fine ornamental iron has supposedly become a lost art. Yet the vogue for the French colonial look, as typified by the balconies of old New Orleans, has caused an increasing demand for wrought iron grillwork. This demand is being satisfied by some welding shops at a nice profit.

Welding has greatly simplified the making of intricate ornamental iron since it makes the joining of many parts so easy. The craftsman of years ago used to spend countless hours in casting and filing parts so that they would fit perfectly. The necessity for much of this labor has been eliminated by welding.

Scrolls Formed and Welded

The pictures tell the story. After the initial "S" scrolls in photo 1 have been formed, smaller scrolls are added for decorative effect. These are welded into place. Even though the parts may not fit accurately, it makes little difference, for a low-amperage, all-position electrode designed for poor fit-up is used.

Square tubing 1 in. square is used for the posts of these grills. The scrolls are bent from 3/16 by 1 in. bar stock. Bending is simplified by merely wrapping the bars around a form made for this purpose. After one section of the grill has been built up between two posts as shown in photo 1, it is welded at right angles to another section consisting of a single post and scrolls (photo 2).

An electrode that deposits an easy-to-remove slag will save a great deal of time in work like this. The actual welding time on the grills pictured is about 30 minutes. There have been cases, however, where as long as 2½ hours have been spent in slag removal. Such a long clean-up time would make this a rather expensive job.

Using Iron Castings

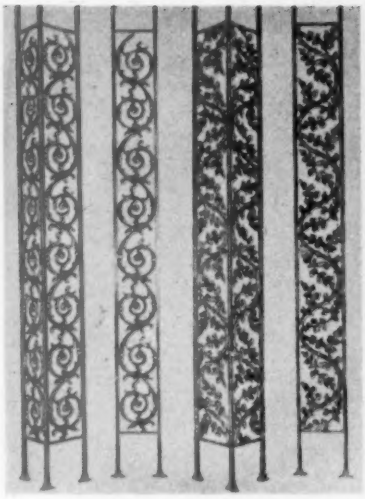
Wrought iron is of course traditional for ornamental iron, but cast iron is frequently substituted in order to make more ornate designs. Castings, however, frequently have defects that must be eliminated. There are "tricks of the trade" in doing this. One weldor, for instance, uses two electrodes to speed up the casting repair job. It works well and is quite effective.

Still another "trick" welding idea appears in photo 3. Here a filler rod is being melted down by a live electrode so that the metal from both rods is deposited. A low spot in a casting may be swiftly built up in this manner. As the arc melts the filler metal, a skilled weldor produces a build-up that cannot be distinguished from the original casting when finished. This technique may be used even on dirty castings. If proper care is exercised, porous-free welds (extremely important in such ornamental work) will be the natural result.

After the castings have been repaired, they may be readily welded into such intricate designs as are pictured in photo 4. These finished examples of cast-iron grills are difficult to make since there is the ever-present danger of cracking during the welding operation. To add to the difficulties, the castings are sometimes welded between structural steel bars or square, hollow tubing. It's not easy to produce a satisfactory joint between steel and cast iron. With the proper electrode, however, the joint will be strong, even under varying conditions, and the danger of cracking will be greatly minimized.

Iron Furniture, Too

Grills are not the only cast-iron parts that are being welded in the ornamental iron shop of today. The



4—COMPLETED porch posts. Such elaborate designs are possible if casting is combined with welding

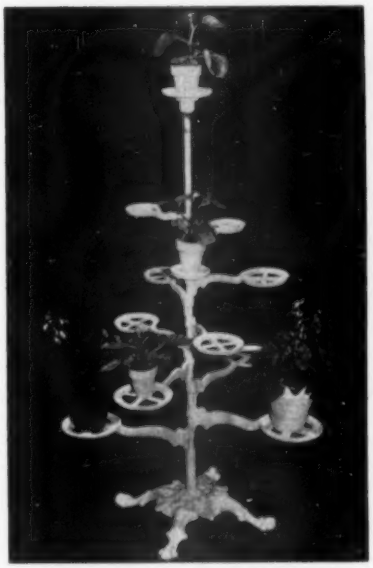
5—GRILLS are not the only products that are being fabricated in a modern ornamental iron shop. Iron porch furniture is equally in demad. This flower pot holder was made by welding separate cast pieces together

Orleans

flower pot holder of photo 5 provides another example of how several cast pieces may be joined together to produce an intricate design. Imagine the mold that would have been required to cast this tricky ornament in one piece! With welding, however, it's a simple, straightforward job.

The real problem of the welding operation is to produce a product that will not be ruined by the paint peeling in the weld area. The adhesion of a paint film depends upon a chemically clean surface. By using an electrode that produces an easily removed slag, clean-up for painting is greatly facilitated.

The movable arms and cast base of the multiple-pot flower stand pictured in photo 6 are joined to a rolled steel standard. The arms are hinged to the standard, but the base must be welded to it. Again cast iron welded to steel! Since the removable arms are required to support considerable weight, the stand must be welded firmly and solidly to the base. A short to medium arc was maintained at a low amperage, using a special electrode for cast-iron welding. To minimize stress and avoid cracking, each bead was peened immediately after it was deposited. By this means, a weld free of porosity was obtained.



6—FLOWER POT stand. Movable arms fasten to bar standard that is welded to a base of cast iron

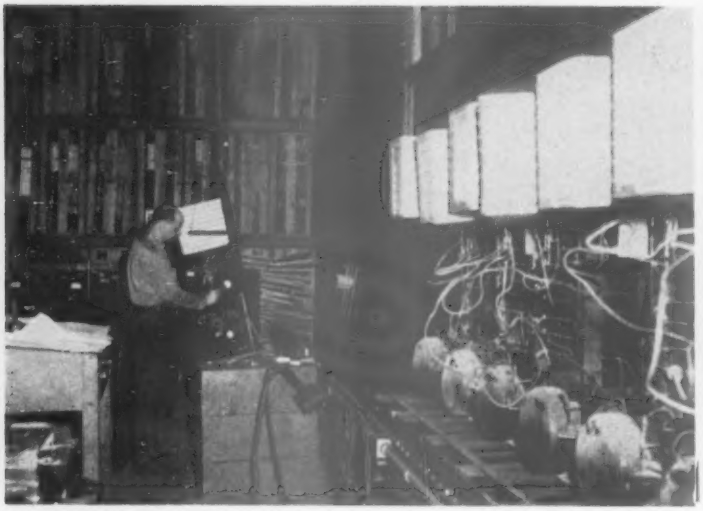
7—ATTRACTIVE iron table was made by joining a sheet-iron top to castings and formed bar stock

Photo 7 provides another example of the manner in which castings may be combined with rolled steel. The fragile appearance of this table is misleading. Furniture of this type must be capable of standing much abuse. A properly welded product can take it.

The table top is a flame-cut and scalloped 12-gage sheet while the legs were shaped from ½-in. bar stock. To weld a thin sheet to rolled steel parts and heavy castings usually results in distortion, skillfully avoided in this instance. Exact finishing for eye appeal was another major consideration. The electrode core was of a highly machinable alloy that would provide a close color match.

Far from being lost, the blacksmith's art of ornamental ironwork has not only been revived but improved upon by the weldor. Today's pieces are even more pleasing in appearance than their antique counterparts.

Photos courtesy of Eutectic Welding Alloys Corp.



Diagnosis . . .

1–INSPECTION starts even before freezing unit is out of its crate

2—UNIT'S troubles are pinpointed on wall inspection chart. Repair information needed is entered on a plant card

Hospital for Sick

These surgeons use oxyacetylene torches to cut and mend their patients, who are the freezing units of ailing refrigerators. Pictures show the procedure.

BY WILLIAM C. HENZLIK

HAPPY relations with refrigerator customers is a Westinghouse tradition from way back. Quick repair or replacement of a malfunctioning unit not only makes a friend for the dealer but often leads the man back for a new model at a later date. Key to the replacement program in the central midwest is the big Westinghouse Manufacturing and Repair (M & R) plant at 3900 West 41st Street, Chicago. This is one of several strategically located refrigerator repair stations.

When the housewife first notices that the vegetables aren't keeping and the milk sours too quickly, she has no idea what is wrong with the refrigerator. In the manner of wives the country over, she delivers an ultimatum to her husband to "do something about getting it fixed." Husband calls the dealer, who may or may not put in a replacement freezing unit. When the dealer decides to replace it, the old freezing unit soon finds its way to the big receiving room of the M & R plant.

Finding the Trouble

Truly a hospital for ailing freezing units, the Chicago plant takes in slightly indisposed assemblies 10 to 25 years old and processes them on a 400-foot U-shaped assembly line. They are returned as good as new to dealers' replacement stocks to find their way back into refrigerators.

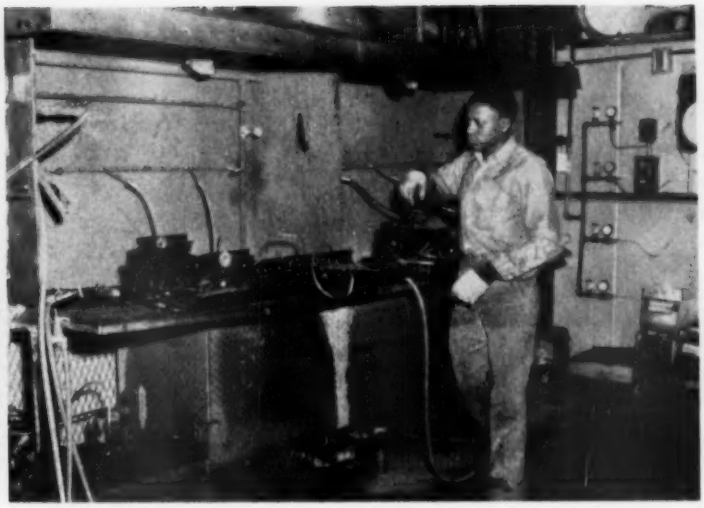
Let's follow a typical unit through the M&R hospital for sick refrigerator units.

Upon being lifted out of its shipping crate at the Chicago plant, the unit is quickly inspected with a flashlight to spot any obvious breaks or leaks (photo 1). These are compared with the report card that the dealer has sent in. Then the unit is placed on the roller conveyor (right of photo 1) to start its long journey back to good health.

Preparing for Surgery

Diagnosis precedes surgery in any well run hospital. Tom J. Byrne gives the unit a thorough inspection and running test, after which he fills out a work card (photo 2) for in-plant use. This card goes with the unit on its trip through the line to point out what special attention may be necessary for certain parts. The freezer units from soft drink coolers and dispensers require a different type of work card.

After a 40-ft ride down the roller conveyor, the freezing assembly undergoes its first bit of surgery. Photo 3 shows copper tubes being flame-cut to separate the compressor from the condenser and evaporator.



Disassembly . . .

3—CUTTING tubing from compressor shell

4—CONDENSERS are cleaned in special degreasing apparatus after stripping. A solvent solution is used. Compressor shell is opened to remove pump by cutting off the arc-welded joint in an upright lathe

Refrigerator Units

The "doctor" handling the torch is Peter J. Poligala, who also uses power screwdrivers and wrenches to further strip down the compressor shell assembly. He hangs the evaporators on an overhead conveyor but leaves the compressor on the original level.

A few feet from the flame-cutting station, the two conveyor lines no longer run parallel. The top line carries the condensers to a pressure cleaning station (photo 4). Here they are cleaned internally by a pressure-washing process. A grease-cutting solvent is used. Another cleaning station completes the job on the evaporators with an external-washing process. After the parts have been cleaned inside out, they are baked to drive out all moisture and are then ready to go to the final assembly station. Here they will be joined to the other components of the freezer.

Let's retrace our steps and go back to the separation in the conveyor lines. The compressor disassembly proceeds at right angles to the main flow. Each compressor shell is placed in a Bullard lathe, and the cutting tool machines off the arc-welded joint that seals the compressor housing. After the joint has been severed, the top is lifted off at the next station. The pump assembly is lifted out of the lower shell and disassembled. The pump itself is disassembled, and its parts are individually inspected for size, appearance and wear.

Most important part of the pump assembly other than the pump is the motor. All those coming in are taken down, and windings, bearings and connections are thoroughly checked. The motor housings are cleaned in rocker-type washers. After the windings have been inspected, they are washed in a solvent and dried.

Compressor Reassembly

When the evaporator, condenser, motor and compressor parts have been inspected, old parts are junked and new ones go in. Everything is cleaned, after which the reassembly of individual and component parts begins. Photo 5 shows a pump that is being started on the road back.

Compressor assembly (to which the pump belongs) is carried on in a specially constructed room in the middle of the refrigerator repair bay. This glassed-in room is sealed off from the rest of the bay to keep out any dust or harmful fumes. The humidity and temperature of the room are controlled also. These measures pay off in reduced marring or corrosion of pump parts after they have been reassembled and sealed inside the compressor shell.

Assembled compressors, with the shell head riding loosely on the lower shell, are placed on a roller conveyor that brings them through a small door to a covered arc-welding booth. The pump is sealed permanently inside the housing by welding. A small rotating positioner allows Weldor Bob Gibson to keep his 3/16-in. electrode in almost the same position as the shell turns under his electrode holder (photo 6). The electrode is an E-6010 type, and the current is 140 amp.

Coming out of the arc-welding booth, the compressor goes to a long welding table where copper tubing is brazed on. Weldor Hyman Shubin uses a phosphorus-copper brazing rod and a brazing flux (photo 7). There is a big water tank at the side of the table for testing Shubin's and Gibson's welding and brazing jobs. Each compressor assembly is fitted to an air line and charged with air at 200 psi. Any bubbles showing up when the charged compressor is submerged indicate leaks. Bad spots are

Turn page to see how the refrigerator units are mended and reassembled

On Road Back . . .

5–PUMP is being reassembled after getting a check-up

6—WHEN old parts have been checked for wear and repaired or replaced, head is welded back on compressor shell and it's carried by conveyor to next station

7–BRAZING joins the ¼-in. copper tubing back to the compressor shell. It's a job for an expert!

8—CHARGING connection is being brazed on. It includes a "bomb" for removal of small amounts of air

9—AFTER recharge, the connections for bomb and charging valve are cut off and sealed gastight

either arc welded or brazed as soon as they are identified.

The remainder of the conveyor line is taken up with further assembly of freezing components. Photo 8 shows Ed Rajsl brazing on a special gas-charging connection. It includes a "bomb" for removing small amounts of air from the unit.

Must Be Dehydrated

The entire assembly is put into a large oven, where it is baked for a minimum of seven hours. This is necessary to remove all traces of moisture from inside the tubing and from working parts where moisture might later cause rust and corrosion.

As soon as the oven heating is finished, each assembly is charged with the proper amount of Freon 12 refrigerant gas. This is accomplished by first creating a vacuum in the gas chamber, then drawing a certain amount of oil in and finally the refrigerant gas. In photo 9, Elmer Bergschneider is cutting off and sealing the charging valve and bomb connections after charging.

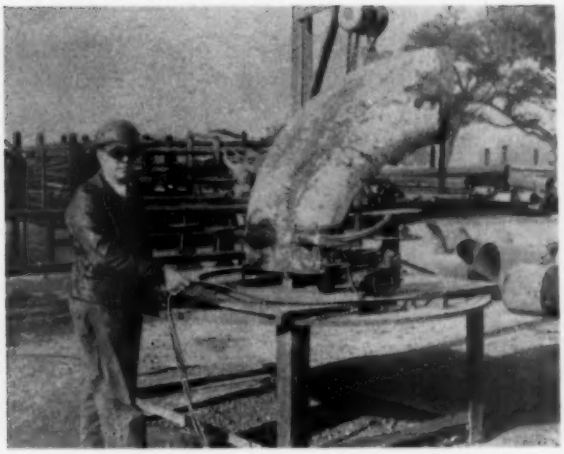
The second leak test is now made in a water dip tank. If all goes well, our freezing unit goes to a second assembly point to have the controls and fans mounted on it. The unit is then operated for 24 hours under observation of Chief Inspector John Piontek. Its final performance test is given in another specially built room where controlled temperature and humidity conditions are maintained. Here the noise level is compared to a standard loudness level.

Final leak test is performed with an electronic leak tester. So sensitive is this new device it can pick up a leak so small that it would allow only 0.01 oz of gas to escape per year. After the electronic leak test, the unit is given a final cleaning to be sure no speck of rust or loose paint is anywhere on it. It is then painted and packed for shipment to the dealer. Eventually it will be keeping some family's milk, fruit and meat fresh in a Westinghouse refrigerator.

1953 To See Full Scale Zirconium Production

Fabrication of zirconium sheets and formed shapes will be achieved on a commercial scale this year for the first time, according to Westinghouse Electric Corp. research men.

1—USED welding fittings are reclaimed by a jig, a welding positioner and portable flame-cutting machine

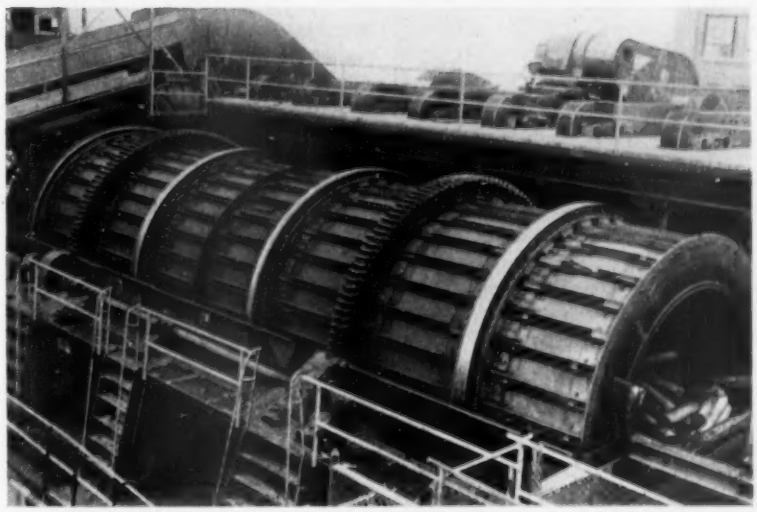


2—ANOTHER jig, made to handle welding fittings up to 36 in. The fitting in jig has a 20-in. diameter

Maintenance in a Paper Mill*

BY DORSEY B. THOMAS

Welding Instructor, Union Bag and Paper Corp., Savannah, Ga.



3—BARKING drum is both welded and riveted. It must be rebuilt periodically because of the mechanical shock to which its service subjects it

IN PAPER mills, as in all other large manufacturing plants, maintenance plays a very important part in production. Without an efficient maintenance program, no manufacturer can produce top-quality products at competitive prices.

Oxyacetylene equipment is found in most of our maintenance departments. I would hate to think of our plant trying to compete with other paper manufacturers without the use of this equipment for such purposes as reclaiming, hardfacing and rebuilding. Before I go into details, however, I would like to tell you a little about the operation of our plant.

Makes Paper Bags

The Savannah, Ga., plant of Union Bag and Paper Corp. is the largest integrated pulp, paper and kraft container operation in the world. Started in 1936 with one paper machine and a small bag factory, it now has five 236-in. paper machines with the necessary pulpmaking equipment, a paper processing department, a by-products plant, a large bag factory and a corrugated box plant. The bag factory produces enough bags every four days to provide one bag for each of the 150,000,000 people in the United States.

A sixth paper machine of the same size is now being installed along with the necessary pulp facilities. This expansion will be completed by fall. Anticipated production with the new addition will be in excess of 1,800 tons of finished paper and paper board daily. Over 200 loaded freight cars enter or leave our plant every day to deliver pulpwood, chemicals and other supplies and to ship out finished products.

With such a scale of operation, lost time in our production machinery can be very expensive. The production loss on one paper machine out of operation will range from $1,000 to $1,800 per *hour*. Now do you see the importance of maintenance?

It is the responsibility of the maintenance department to keep the plant in good operating condition. This

*Abstract of paper given at the annual meeting of the International Acetylene Association, Atlanta, Ga., April 13-15, 1953.

Arc Length—Current—

Key to an understanding of automatic welding will be found in the relationship between the above three variables. This "back to fundamentals" article is easy to read and tells you what you need to know.

BY BRUCE L. BAIRD

Welding Products Division, American Manganese Steel Division of American Brake Shoe Company

PART ONE

THE performance of almost any electrical circuit (or machine) can be explained in terms of two simple electrical characteristics. These are voltage and current. Voltage is the driving force which causes electrical energy to flow through a circuit. It is analogous to pressure in a hydraulic system. Current is the rate of flow of electrical energy through a circuit. It is analogous to the rate of flow (measured in a unit such as gallons per minute) of liquid through a hydraulic system.

The power consumed by an electrical machine is the product of the current flowing through the machine times the voltage drop between the points where the current enters and leaves the machine. A voltmeter measures the voltage drop across a machine and an ammeter measures the current flowing through the machine.

This discussion is centered around one specific make of a-c automatic welder. The same general principals apply, however, to all types of automatic welders, both a-c and d-c, with the exception of the relatively new constant-potential unit.

Most automatic welders consist of combinations of five simple electrical devices. These are: (1) relays, (2) transformers, (3) autotransformers (or voltage dividers), (4) electric motors and (5) generators. Let us have a look at each of these in turn.

THE RELAY

A relay is simply a switch that can be operated by remote control. It consists of a coil, a core, an armature and a set of contact points.

Figure 1 illustrates a typical relay application for an a-c automatic welder. The switch for turning on and off the source of welding power is located in the welder control panel. The coil, core, armature and contact points are located within the welding transformer housing. When the points of the relay are connected, a voltage of 220 volts is impressed on the transformer primary coil. This makes available welding voltage at the electrode.

The relay operates in the following manner:

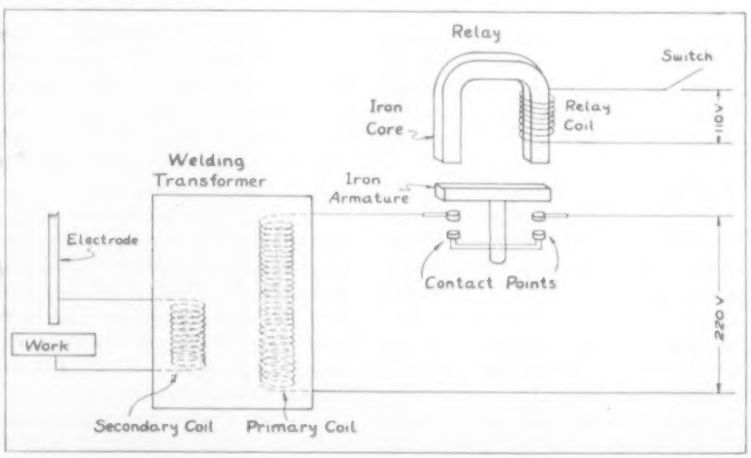
When the switch in the control panel is closed, a voltage of 110 volts is impressed on the relay coil. This causes a current to flow through the coil, setting up a magnetic field around the relay core. The core then acts like a U-magnet. The force of the magnetic field pulls the relay armature up to the core, which closes the contact points and connects the primary coil to the power line.

THE TRANSFORMER

Transformers are used to raise or lower alternating currents and voltages. (Direct current cannot be transformed.) If voltage is raised by the transformer, current must be lowered. If voltage is lowered, current must be raised. A schematic sketch of a simple transformer appears in Fig. 2. It consists essentially of a primary and secondary coil wound around a soft iron or steel core. (The primary side is the input side; the secondary side is the output side.)

To step up voltage, the rule is: Have more turns in the secondary than in the primary coil. With twice as many turns in the secondary coil of a transformer, the open-circuit voltage induced in the secondary coil will be twice as great as the voltage impressed on the primary coil. Conversely, with half as many secondary as primary turns, the open-circuit voltage will be half as great. The term "open circuit" should perhaps be explained. In terms of welding, open circuit occurs when no arc is being sustained and the electrode is not shorted to the work.

The secondary voltage and the primary and secondary currents under load (work output is usually referred to as load) are dependent on the amount of load, the capacity of the transformer and the design of the transformer. In the case of welding transformers, when the load is increased, the primary and secondary currents are usually decreased. The current flowing through the secondary coil of a transformer is greater or less than the current drawn by the



1—RELAY is a switch that can be operated by remote control. Its basic ingredients are a coil, a core, an armature and a set of contact points.

Voltage

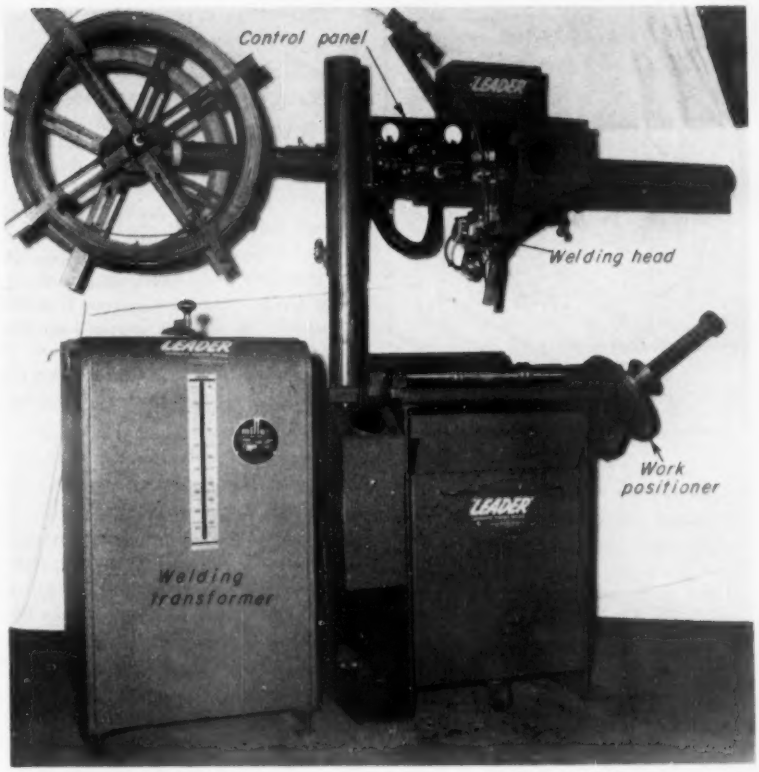
primary coil in proportion to the ratio of the number of primary and secondary turns.

To increase current, the rule is: Have more turns in the primary coil. If there are twice as many turns in the primary coil, the current flowing through the secondary coil will be twice as great as that drawn by the primary coil. The reverse is true for half as many primary as secondary turns.

Transformers can be designed to maintain a constant secondary voltage as load increases or decreases, or they can be designed for a variable secondary voltage as load increases or decreases. The transformer a power company installs to feed a shop is of the constant secondary-voltage type. A welding transformer is of the variable secondary-voltage type.

The capacities of transformers are generally rated in terms of kva. This stands for kilovolt-amperes, a kilovolt being 1,000 volts. If the product of the voltage times the current (this is load) drawn by the secondary side of a constant secondary-voltage transformer exceeds the kva rating of the transformer, the secondary voltage will drop. This is a condition of overload. If the overload is very great, the coils of the transformer will overheat.

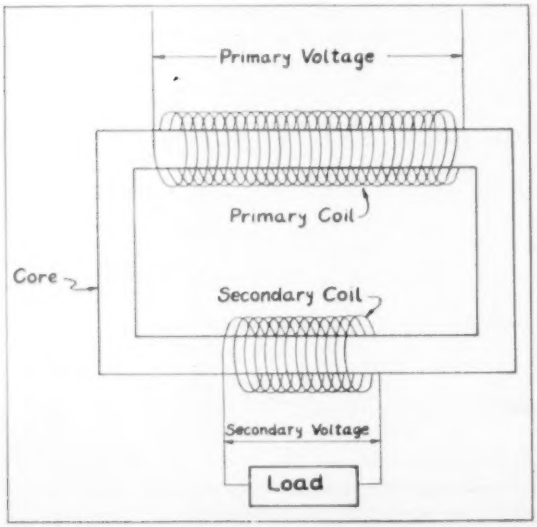
The typical welding transformer does not differ basically from the transformer sketched in Fig. 2. Adjustment of welding current is, however, sometimes effected by means of a movable crank-operated core. The crank changes the space relationship between the coils and the core, and this changes the current drawn by the primary coil. An increase or decrease in primary current results in a proportional increase or decrease in secondary (welding) current. Probably the most common method of changing current is through the use of a crank-operated magnetic shunt.



WITHOUT X-ray vision, here's all you can see of an automatic set-up. Work positioner is separate from the welding equipment, which includes the welding transformer (power source), welding head and control panel

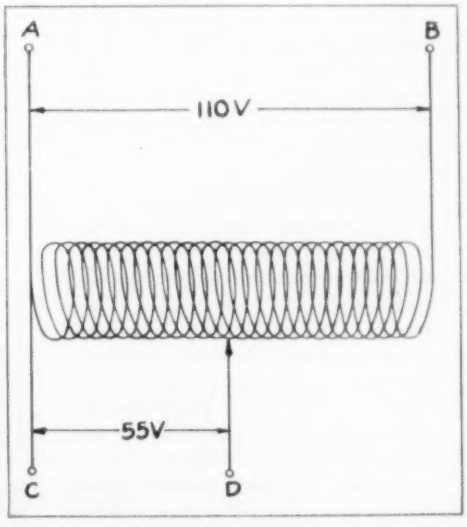
The Autotransformer

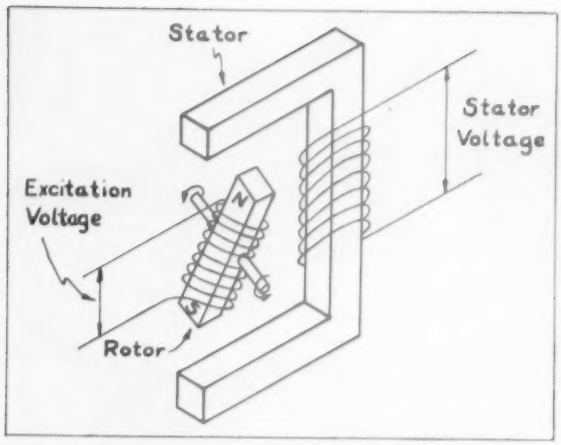
Although it has only one coil, the autotransformer can be considered as



2—TRANSFORMER has two coils and a core. The ratio of turns in the two coils determines the secondary current and voltage

3—THOUGH it has only one coil, the autotransformer can be considered as a transformer with a primary and a secondary side. Circuit from C to D is secondary side





4—MOTOR elements are the rotor and stator. Direct current through the rotor coil (excitation) makes it a magnet with fixed poles. Stator receives alternating current. A generator is like a motor but with reverse action: it produces current through consuming work

a transformer with a primary and a secondary side. A sketch of an autotransformer circuit is shown in Fig. 3. Let the circuit from A to B, through all the turns of the coil, be the primary side. Then the circuit from C to D, through half the turns of the coil, is the secondary side.

The autotransformer appears in one form or another in the control circuits of almost all automatic welders. It is simply a means of transforming or dividing voltages. In Fig. 3, a voltage of 110 volts is indicated as being impressed on the primary side. Since there are only half as many turns in the secondary, only half of the primary voltage, or 55 volts, is induced across the secondary circuit.

In the autotransformers of most automatic welders, the contact point from terminal D can be slid along the coil to change the secondary voltage through the complete range from 0 to 110 volts. In speaking of an a-c operation, the coil and hook-up of Fig. 3 is ordinarily referred to as an autotransformer. In a d-c operation, it is referred to as either a rheostat or a potentiometer, depending on its hook-up.

The Electric Motor

The principal elements of an electric motor are the rotor and the stator. Both of these are pictured in Fig. 4. The rotor is (for purposes of illustration) shown as an iron bar pivoted so it can rotate. The stator (fixed) is shown as a U-shaped piece of iron. The rotor can rotate only within the ends of the stator. Both rotor and stator have coil windings.

If direct current is passed through the rotor windings, the rotor will become a bar magnet with fixed north and south poles. Now let a 60-cycle alternating current be passed through the stator windings. This turns the stator into a U-magnet, but the north and south poles are not fixed. Because the direction of current flow reverses 120 times a second, the north and south poles of the stator magnet will likewise reverse 120 times a second. Bear in mind that like poles of a magnet attract each other; unlike poles repel each other.

Now let us suppose that the rotor is set in rotation by some outside force at a speed of 60 revolutions per second. The north and south poles of the stator will shift from one end to another at a rate of 120 times per second. First, the poles of the rotor will be attracted and thus drawn into a vertical position. Then the shift occurs and the rotor poles will be repelled toward a horizontal position. Then the vertical position once more, then the horizontal—all in the same direction of rotation. The net effect is to cause a continuous rotation of the rotor at a speed of 60 revolutions per second (3,600 rpm) *after the outside driving force has been removed.*

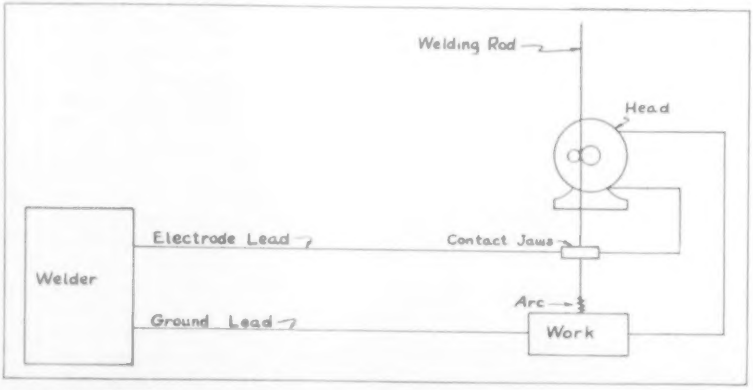
The type of electric motor sketched in Fig. 4 is called a synchronous motor. If it is built with a two-pole rotor and stator, it must operate at a speed of 3,600 rpm. Since this speed is rather high, most synchronous motors are built with four-pole rotors and stators so they will operate at 1,800 rpm. The basic synchronous motor is not self-starting, as you have probably noted. It must be brought up to speed before it will operate under its own power.

There are two types of coil windings: armature windings (those that carry the power) and field windings (those that make possible an effective use of the power). In Fig. 4, the stator windings are the armature windings and the rotor windings are the field windings. By varying the internal wiring, electric motors can be given different characteristics.

Some electric motors run at constant speed like the synchronous motor but are self-starting; other motors are both self-starting and run at variable speed. Most of the motors used in automatic welding are of the self-starting, variable-speed type. The speed is changed by varying the voltage impressed on the field windings or on the field and armature windings together. This is often done through use of the autotransformer.

The Generator

The operation of an electric generator is basically the same as the operation of an electric motor. Furthermore, the construction of a generator is almost identical to that of a motor. The only difference between



5—SIMPLIFIED automatic circuit. The welding head is, essentially, an electric motor; the welder (power source) a transformer or generator

them is that the motor produces work through consuming power, while the generator produces power through consuming work.

Let us suppose that the rotor of Fig. 4 is turned by an electric or gasoline-engine-driven motor, as it is in a welding generator, while a small direct current is passed through the rotor windings to convert the rotor into a bar magnet. Under these conditions, an alternating voltage is produced in the stator windings. If the speed of rotation of the rotor were regulated at 60 revolutions per second, a 60-cycle alternating voltage would be produced. In a welding generator, a commutator converts the alternating to direct current.

When the handle of the current selector on a welding generator is rotated, the amount of current flowing through the field windings is changed. This causes a change in the open-circuit voltage produced in the stator windings. The voltage produced in the stator windings is the welding voltage.

The Automatic Welder

Now that we have studied the pieces separately, let's try to put them together. Figure 5 is a simplified circuit diagram of a typical automatic welder. Its two most basic components are the power source (welder) and the automatic welding head.

The welders used for automatic operations are the same as those used for manual welding. The power source may be either a generator (d-c welding) or a transformer (a-c welding). (A third type of welder (d-c) is the selenium-rectifier transformer type, which has lately been adapted to automatic welding.)

Welding Head Is a Motor

The automatic welding head is simply an electric motor with some refinements. Its job is to feed the welding rod (usually a coil of wire) into the weld zone. The one basic requirement is that the motor must be able to run at varied speeds. In manual welding, the operator (welder) must correct for variations in arc length. In automatic welding, the head, through changing speed, must correct for variations in arc length.

There are several reasons why it is difficult to hold a constant arc length:

First, no electric motor runs at an exactly constant speed. The speed of the rod-feed motor (head) will often be affected by the drag of the welding wire as it unreels and by fluctuations in shop power.

Second, very few workpieces have an absolutely smooth surface. Even minor variations in surface contour can change the arc length.

Thirdly, no commercial welding machine puts out an absolutely constant current. Variations in current cause variations in rod burn-off rate, which changes arc length.

Arc Is Load

In electrical terms, the drop in voltage caused by a machine doing work is referred to as an effect of load. In welding terms, the arc can be considered the load. To be exact, the load includes the total drop between the external terminals of the welder. The drops in the welding cables and other components of the automatic welder are, however, minor as compared to the drop across the arc.

Arc length always corresponds to voltage drop. When you increase the arc length, you increase the voltage drop; if you decrease arc length, you decrease the voltage drop.

For all practical purposes, a condition of zero load (short circuiting) occurs when the electrode is touched and held to the work without striking an arc. If instrument readings are taken when this occurs, the welding ammeter will show a high reading and the voltmeter will show almost a zero reading—obviously, there can be no drop in voltage across a non-existent arc.

We have seen that the shortening of an arc results in a decrease of arc voltage. It also results in an increase of welding current (when you are operating within the design limits of the welder.) More current burns up the rod at a faster rate. Conversely, a longer arc means greater arc voltage, less current and less burn-off.

Now let us see what happens when the welding rod is fed to the arc at an approximately constant rate. When, for the reasons previously mentioned, the arc becomes short, the rod burns off at a faster rate. Since the rate of feed is constant, the arc must lengthen. This decreases the burn-off rate again and tends to restore the status quo.

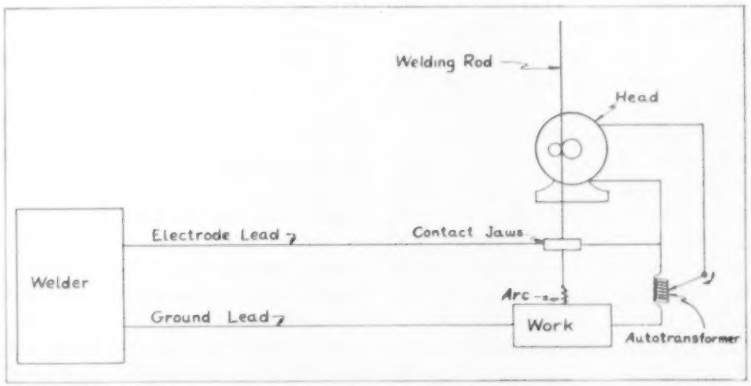
Voltage Regulates Rod Feed

Unfortunately, this inherent relationship of short arc-high current, long arc-low current is not enough by itself to maintain a stable arc. All automatic welders* are given additional control of arc length by varying the speed of the rod-feed motor. A decrease in arc length (or voltage) will decrease the rotational speed of the head. Similarly, an increase in arc length will increase the rotational speed of the head.

The simplest method of obtaining this additional control is to allow the arc voltage itself to drive the welding head. To do this, all that is necessary is to connect the head in parallel across the arc, as shown in Fig. 5. As the arc length varies, so does the voltage impressed on the motor windings and so does the motor speed.

Suppose that an arc length corresponding to a 30-volt drop across the arc is established at a welding current of 300 amp. Should the arc voltage fall to 25 volts, the welding transformer (or generator) would increase

(Continued on page 43)



6—CIRCUIT of Fig. 5 with the addition of an autotransformer. Now any arc length can be maintained at any welding current (within limits)

*Except the constant-potential type.

Old Ket in a Pickle

Beginning a new series of yarns on the trials and errors of Old Kettlehead. These are fictitious, but wait! Haven't you known someone like old Ket, sometime?

BY CLEMENT HOWARD

"You can't weld this kettle, Buster!"

Most weldors are swell fellows. Every once in a while, though there comes along some joker who likes to make life miserable for the poor devil who's been selected to demonstrate at a welding clinic. These clinics are staged by manufacturers to acquaint their customers with new rods, processes and procedures for welding. Most people go there to learn but not all. A few go only to attract attention to themselves.

Favorite Tricks

One of the good old favorites is to take the sample the factory man has just finished welding, dunk it in cold water (if that will make it brittle) and cut a notch in the weld deposit with a hacksaw. Then our humorist takes the biggest hammer available, hauls off and hits the part a resounding blow that is sure to break the weld. He always likes to direct the blow so the broken part will fly toward the most influential spectator in the audience. Very, very funny!

Here's one that really slays you! Our joker grabs the nice, clean, ground pieces of die casting that are lined up on the bench to weld, lays them on the floor and pounds heck out of them with a ball-peen hammer. Then he hands them back to the demonstrator and says, "Now weld them." Factory men just love this appealing character.

We've met all types in conducting factory demos, but the boy that really takes the cake in our memory is Old Kettlehead. Call him "Ket" for short. He has a deep foghorn voice, likes his liquor in quantity if not quality and loves nothing better than to exercise his vocal chords after he has imbibed.

Holes They Couldn't Weld

Old Ket worked in a sheet-metal shop and flattered himself that he knew everything that needed to be known about welding. One day the boss called him in and gave him what is laughingly termed a "routine job." It was a 40- gallon aluminum kettle with holes in its bottom.

That kettle—very big it was and very old—was owned by a local restaurant. Small holes had appeared in it, and the restaurant owner took it to a welding shop. The shop returned it with bigger holes, saying they couldn't make the repair. The kettle went on to several more shops, and each time it was returned with bigger and better holes. The bottom was practically all hole, by the time Old Ket's boss got the job.

It had to be repaired, though, the restaurant man insisted. He couldn't find another like it on the market, and his situation was becoming desperate. Old Ket and his boss talked it over between them and decided that the thing to do was to cut out what was left of the bottom and weld in a new one.

It sounded simple enough. Originally, the kettle had been cast, and the walls were over 1/8 inch thick. No one in town had any aluminum plate that thick, so it was decided to cut the new bottom out of 1/16-in. sheet. This was turned up around the edges about half an inch in order to give more surface area to weld on.

Metal-arc welding could not be used because of the thinness of the bottom sheet; inert-gas welding was not common at that time, so the oxyacetylene method was the only process left. By the time Old Kettlehead got around to the welding torch, he found himself up against the same thing everyone else had run into. The darn rod simply would not take to the edge of that cast kettle. Ket could get the rod to flow to the edge of the light-gage bottom, but the rim of the kettle just kept sloughing off. He had to use a big tip to get the rod to flow at all, and if he did get a little metal to stick to the edge, he always had so much heat that he was right back where he started from—a hole in the bottom.

Old Ket tried and tried to weld that bottom without any success at all. He finally got so worked up about it, he couldn't sleep nights thinking about it. His wife was mad at him because of his disposition and even the boss had started to look at him with a jaundiced eye. But one night soon he got his chance to get revenge on the boss, the restaurant, and everyone in general remotely connected with that kettle. Some poor sucker was coming to town to demonstrate welding rod. Kettlehead was sure that this poor lamb was his meat.

Came Well Oiled

The clinic was held in the evening after working hours. Before the meeting got started, Kettlehead took on plenty of liquid refreshment. His foghorn voice was in good form but to keep it well oiled he brought a bottle of throat medicine with him. The meeting was well underway when Old Ket floundered through the door with the kettle and staggered up to the bench where the factory man was demonstrating some new aluminum brazing rod. Old Ket didn't say a word, just set the kettle down ginger-

ly and staggered back to the last row of seats. Then in his basso-profundo voice he let out a bawl, "Buster, that stuff's okay on these little jobs, but wait until you try it on that kettle."

The demonstrator tried to ignore him, so Ket said it again. By the time he had said it about 14 times, the meeting was a riot. The demonstrator simply could not generate any interest at all in the rods he was demonstrating. He had to weld that kettle (if he could), or his show would be a colossal flop. He shrugged and took up Old Ket's pet nightmare.

To save his face somewhat, the demonstrator announced that those not interested in the experiment wouldn't be considered impolite if they left. Of course not a person left. Instead, they all gathered around the welding bench like a bunch of wolves waiting for a piece of the lamb.

The factory man knew there was a catch of some kind to that kettle, but he could not remember ever running into or hearing of any aluminum that could not be welded or brazed. First, he cleaned up the edges good with emory paper, where the rod was supposed to flow, and fluxed the surface with paste flux that would not blow away when the torch was applied.

Kettle Melted Down

He selected a tip of No. 44 drill size (orifice slightly over 1/16 in.) and then heated the base and the sides broadly with a medium-size flame. After quite a few minutes of preheat, he applied the torch to a local area. Old Ket's old trouble again! The metal that melted from the filler rod just wouldn't stick to the edge of the kettle. The demonstrator tried several more minutes of preheat, but still no soap. When he tried to weld the edge again, the kettle started to melt down like wax running off a candle. And still the rod would not stick.

After several more minutes of this, Old Ket let out another bellow.

"That (unprintable) is okay on the little stuff, Buster, but it won't weld that kettle. Your rods are no better than any of the rest."

By this time the demonstrator had figured a way out and decided it was high time to cut Old Ket down to size. He hooked up an extra torch on his set of cylinders.

To make Kettlehead feel more important, he asked him to light up that extra torch. Old Ket wanted to know why. "No questions," said the factory man, "just light up that torch and play the heat about 6 in. below where I'm holding mine and keep it about the same distance away."

Kettlehead was becoming a bit belligerent. He couldn't see any sense to it, but he couldn't very well back out now. Amazing! As he followed the other torch around the wall of the kettle, it wasn't more than 30 seconds when—lo and behold!—the brazing rod started to flow along that bottom edge and the new base like melted butter.

Kettlehead couldn't seem to believe his own eyes. For a minute or so, his voice failed; then he gave vent to an exclamation.

"Well, I'll be an S.O.B.! I'll be an S.O.B.!"

After the factory man had the welding about half completed, he handed his torch to Kettlehead and said, "You finish it." Old Ket did a beautiful job, too, but all the time he was muttering to himself, "I'll be an S.O.B. I'll be an S.O.B."

While he was welding, he was perfectly oblivious of the jibes of the fellows around him. Then they began to poke him in the rear with rods, tools, anything they could get their hands on, but he never turned around.

The punch line to this story is what a friendly member of the audience confided to the factory man:

"The first time I saw that kettle it was at least 8 in. taller."

KETTLEHEAD coat of arms. When you see this insignia, it means another yarn about Old Ket

ARC LENGTH—CURRENT—VOLTAGE

(Continued from page 41)

the current output. The increased current would increase the burn-off rate and tend to lengthen the arc again. Furthermore, the drop in voltage would also cause the head to slow up and thus decrease its rate of feeding rod to the weld zone. The combined effect of increased current and decreased head speed would reestablish the 30-volt arc automatically. The same combined effect would take place in reverse should the arc lengthen to correspond to a 35-volt drop.

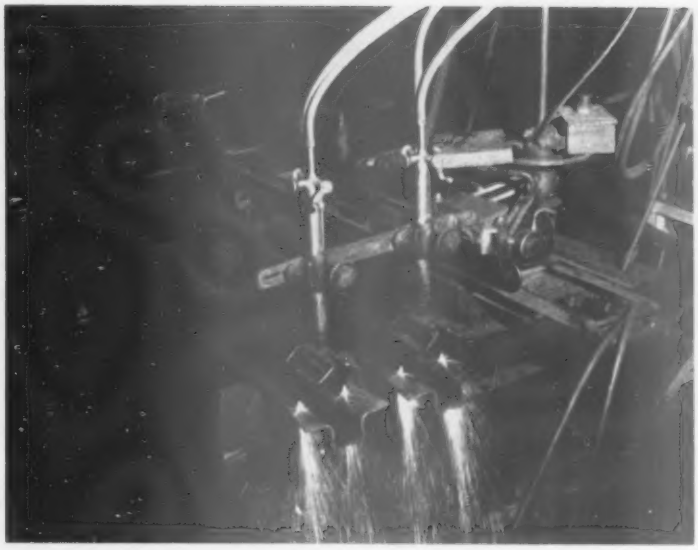
Adding Autotransformer

An autotransformer with a sliding secondary contact point is required to complete the a-c automatic welder. We have already seen how the autotransformer works. It's function in the automatic welder circuit is to allow any arc length to be maintained at any welding current (within certain limits). Without the autotransformer in the system, the arc length would remain constant for a given setting of welding current but would increase or decrease if the current setting were increased or decreased.

When our Fig. 5 is redrawn to put the autotransformer in the system, we get the circuit of Fig. 6. Now the arc voltage is impressed on the primary side of the autotransformer (all turns). The voltage of the secondary side (number of turns selected by the variable tap) is impressed on the welding head.

Other devices incidental to the operation of an automatic welder include switches, relays, measuring instruments and drive rolls for feeding the rod. There are also devices for amplifying changes in voltage drop across the arc and therefore varying the speed of the welding head in a more complex manner than the explanation we have given.

Part II of "Arc Length—Current—Voltage" will be published next month. In his second and final installment, Mr. Baird will discuss such important considerations as what to do about an unstable arc, automatic welding flux, drive roll pressure and the particular complex of problems that are encountered when automatic welding is done on cylindrical workpieces.



1–FLAME-CUTTING side stakes formed from 5/16-in. plate with two-torch head. These stakes are welded to car sides (see photo 4)

2–CROSSBEARER in a special jig is being welded with a submerged-arc head

A Railroad Goes into

On the shore of Lake Winnebago, near Fond du Lac, freight cars are being constructed at a considerable saving to the Soo Line Railroad. Welding is indispensable.

BY CLYDE B. CLASON

A PORTION of the Soo Line's locomotive shop at North Fond du Lac, Wis., has been converted into a car-building shop. The conversion was made by the railroad's own men, with assistance and advice received from manufacturers of equipment. They are particularly proud of this car-building operation at North Fond du Lac because it is so nearly an exclusive home-talent enterprise.

The Soo Line (more formally known as the Minneapolis, St. Paul and Sault Ste. Marie Railroad Co.) serves an important part of the states of Illinois, Wisconsin, Minnesota, North Dakota, South Dakota and the upper peninsula of Michigan. From its headquarters in the Twin Cities, some 4,300 miles of railroad lines radiate south to Chicago, east to Sault Ste. Marie (the "Soo" that gives the railroad its name), north to Lake Superior and to Winnipeg and west to the Pacific Coast (through a connection with the Canadian Pacific Railway at Portal, N. D.).

The men who laid out the North Fond du Lac car-building plant have reason to be proud of their highly efficient car production line. At the time of this writer's visit, work was in progress on an order for some 200 all-welded steel general service type gondola cars, known in the trade as "gons." These are about 50% submerged-arc and 50% manual arc welded. Only castings and other specialty items are purchased outside; all other parts are shop cut and fabricated.

Any railroad car, freight or passenger, is surprisingly complicated when seen from close by. The "gons" are no exception. Hundreds of parts must be cut, formed and welded before the finished car can roll down the tracks.

In photo 1, we see one of the many different kinds of jobs that are necessary: the flame-cutting of side stakes. Before cutting, these stakes were formed from 5/16-in. steel plate. Cutting is done automatically with a two-torch head. Each torch has twin flames that trim down two flanges of a stake at one time, converting a hat-shaped member into a simple U-shaped member.

Backbone and Vertebrae

Structurally, the most important part of the car is the underframe, a complex assembly of longitudinal and cross members. Running down the center is an extremely massive fabricated beam that is known as the center sill. If you think of this as the backbone, then the vertebrae of the underframe are the various members perpendicular to the center sill. There are three types of such cross members: bolsters, crossties and crossbearers. There are four bolsters on a car—two at each side of the center sill—four crossties and six crossbearers.

The bolsters, the heaviest members go at the front and back ends of the car. The crossbearers are located toward the center, and the crossties are between the bolsters and crossbearers. Both the crossbearers and the bolsters are made in a sort of trusslike design with upper and lower

3—WELDING through slots is done to add stiffener plate to Z-bar. Operator uses a flexible, semiautomatic submerged-arc welding head

4—SAME flexible welder of photo 3 also welds side stakes to car side sheets

Car-Building Business

plates, webs and stiffening plates. The crossties have a relatively simple I-beam construction without the bowing that characterizes the bolsters and crossbearers.

Three Jigs, One Welder

The three jigs for the subassembly of bolsters, crossbearers and crossties are arranged for straight-line production. A submerged-arc head, mounted on a track about 30 ft long, travels from jig to jig to do the welding on all three members. Its power source is a 600-amp d-c welder, set reverse polarity.

Two helpers assemble the components and clamp them into place for welding. This is simple because the jigs have built-on eccentric clamps (six clamps per jig). It takes the helpers about a minute to load or unload a jig. Each jig also includes a copper back-up plate. No manual welding at all is done at this station —not even tack welding.

Using this efficient set-up, one weldor can weld enough bolsters, crossties and crossbearers for three cars in half a day. For three cars, the figures are:

12 body bolsters, 98 ft of welding, 1 hour 12 minutes.

12 crossties, 96 ft of welding, 1 hour.

18 crossbearers, 144 ft of welding, 1 hour 30 minutes.

The total 42 pieces require 338 ft of welding, done in a total of 3 hours 42 minutes.

The bolster members have top plates $\frac{5}{8}$ in. thick, web plates $\frac{3}{8}$ in. and bottom plates 7/16 in. The welds are fillet welds, made at a travel speed of 20 ipm, using 500 amp, reverse polarity, 28 volts, 3/16-in. mild-steel wire.

Crossties, four to a car, are also welded at 500 amp, r-p, 28 volts, with 3/16-in. wire. Travel speed is 20-22 ipm. Top is $\frac{3}{8}$-in. plate, web $\frac{1}{4}$-in. plate, bottom $\frac{3}{8}$-in. plate.

Photo 2 shows a crossbearer that is being welded. You can see how the fixture holds the assembly at about 45 deg so that the fillet weld will be made in the flat position. Most of the welds on the three types of cross members are fillets, generally welded on only one side.

In addition to the main seams on the bolsters, crossties and crossbearers, much welding has to be done to add ribs, side bearings, door stops, etc.

The backbone of the underframe is the center sill member. This is formed by welding together two Z-bars. Z-bars, in case you are unfamiliar with the term, are not actually Z-shaped in cross-section but have upper and lower flanges that go in opposite directions. When you join two Z-bars by butt welding them together at their widest flange, you will get a hat-shaped beam. This is the center sill. The Z-bars from which it is made have top flanges 7/16 in. thick, bottom flanges $\frac{3}{4}$ in. and webs $\frac{5}{8}$ in.

Welding through Slots

Before these two Z-bars can be butt welded, it is necessary to do work on what later on will become the inside of the center sill. Using twin nozzles on a straight-line cutting machine, five slots are cut through a stiffener plate that is to be welded to a Z-bar. Two of these slots are 9 in. long, two 9½ in. long and one 10 in. long. Each slot is cut on a "V," leaving a ½-in. opening at the bottom and a $\frac{3}{4}$-in. opening at the top. Through these slots, welds are made to join the heavy stiffener plate that supports the stop casting. There are eight stop castings, four at each end of the car, requiring a comparable

5–WELDING Z-bars to form center sill. Twin-flame torch at left preheats in advance of the welding head

6–AFTER Z-bars have been joined, same fixture and welding head add an I-beam above the center sill

number of slot-welded stiffener plates.

Photo 3 shows how the welding is done. Air clamps force the stiffener plate down on the Z-bar and hold it there while the welds are made through the five slots. Welder is a 400-amp d-c machine. Welding head is of the semiautomatic or "squirt" type and is mounted upon a long, flexible arm. Welding is done at 365 amp, r-p, 28 volts, with 3/32-in. wire.

Night-Time Duty

The same flexible welder is used for an altogether different welding job at night. When the day shift relinquishes it, the night shift takes over and puts it to work on the welding of side stakes to side sheets. Photo 4 shows this operation. The stakes are those we saw before being flame-trimmed, and the sheets are 3/16-in. thick. There are four sheets to a car side—two sheets 10 ft long by 60 in. high and two sheets 10 ft 5½ in. long by 60 in. high.

There are seven stakes to be assembled on each car side. They are toggle clamped at top and bottom and then welded with the same flexible welder that did the slot welding on the Z-bars. To do this work, the operator uses a bar skid; it rests on the side stake (as can be seen in photo 4) and properly aligns the rod feed into the weld area. Welding is at 365 amp, r-p, 28 volts, with 3/32-in. wire.

Returning now to the Z-bars, we are ready to watch construction of the center sill. When the two Z-bars are placed together, the resulting hat-shaped beam measures 12⅞ in. from web to web and is 42 ft 10 in. long. One butt weld is all that is necessary down this long seam.

Photo 5 shows the welding head and a portion of the long fixture in which the two Z-bars are clamped. Clamping is done by means of 14 air cylinders—seven on each side. There are also two air cylinders on the ends to shove the Z-bars into place before they are clamped. The proper camber of the beam as a whole is secured and maintained to allow for welding distortion.

Back-up by Flux

A most interesting feature of this fixture is that a flux back-up is employed instead of the conventional copper back-up plate. The back-up flux is held in position by rubber tubing inflated to a pressure of 40 psi. When the tubing is deflated, the flux drops down to a trough, where it is saved and used over and over again.

Another interesting feature, also shown in photo 5, is the method of preheating. Mounted on the same carriage as the welding head is a twin-flame torch with two No. 20 tips (drill size 52) that precedes the welding head. Traveling with the welding head at a speed of 24 ipm, the torch flames warm up the cold metal, pop scale loose and burn off foreign matter immediately prior to welding. It is a very clever idea, and it works beautifully.

The welder is a 600-amp d-c machine, set reverse polarity. The welding head is controlled electronically to maintain the proper current, voltage and travel speed. These are, respectively, 575 amp, 28 volts, 28 ipm.

The center sill is completed by fillet welding to it the 11/16-in. flange of an I-beam. This operation is shown in photo 6. The welding is done in the same fixture and with the same welding head that was used to put the Z-bars together. Welding is at a speed of 24 ipm, 550 amp, 28 volts, using 3/16-in. wire. The same method of torch preheating is employed for the I-beam fillet welds, but the torch is equipped with a No. 40 tip (drill size 44).

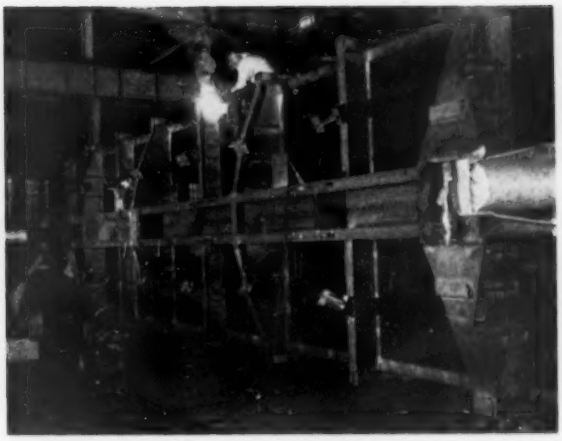
The I-beam runs almost the full length of the center sill. For fillet welds in each side, the total welding required is 82 ft 2 in. per car.

Welding Bulb Angle

All of the welding on the center sill is done by the day shift. When the night weldors come on, they put the same welding head and fixture to work on an entirely different task. This is the welding of a top piece called the bulb angle to the car side sheet. In photo 7, a car side with the top bulb angle just added to it is being removed from the fixture. The weld is a fillet that is made between the bottom of the bulb angle and the sheet. Welding of the ⅜-in. bulb angle to the 3/16-in. side sheet is done at a current setting of 450 amp and a travel speed of 28-30 ipm. The weld is 40 ft 10 in. long.

The same electrode wire and flux are used as for the center sill welding, but the pneumatic flux back-up is not employed. For this particular weld, a copper back-up plate is used. If you are interested in the pneumatic

7—ANOTHER job for the center sill fixture: bulb angle is welded to car side sheet by the night shift



8—UNDERFRAME assembly has been clamped in a big positioning fixture to receive the car sides and ends

flux back-up, however, you can catch a glimse of it under the side sheet of photo 7.

In contrast to the large amount of automatic welding employed to fabricate the various subassemblies, general assembly is done almost entirely by manual arc welding. It is customary to use a skip-welding technique to avoid distortion. Where watertight seams are not essential, intermittent welding is sometimes done—an example will be found on the slope angle that connects the side sheet to the end sill of the underframe. This seam is only 50% welded.

Assembly of the gondola car begins, properly, with the underframe. An overhead crane carries the center sill, bolsters, crossbearers and crossties, side sills and end sills to a specially designed assembly jig. This jig is equipped with 14 air clamps —seven on each side. In addition, there are four air clamps on each side to clamp the center sill. When these various structural members have been assembled and welded, the underframe is picked up by a 30-ton overhead crane and carried to a positioning fixture (photo 8) to receive the sides and ends.

The counterbalance fixture is capable of rotating an entire car. The weldor (top of photo 8) is working on a side sheet, doing all the welding in a flat position. When he finishes, the frame will be turned 180 deg for welding on the other side sheet, just clamped into place at the bottom.

When all side and end welding has been completed, the overhead crane picks up the car and carries it to another production station. At this station, couplers, safety appliances and eight doors are applied, and the car is trucked. It is then moved on its own wheels to another building, where the remainder of the doors are hung and fitted, safety appliances are riveted (the only riveting on the entire car) and brakes are applied. Painting comes next, after which the car is dried overnight and then stenciled with the well known insignia of the Soo Line (photo 9).

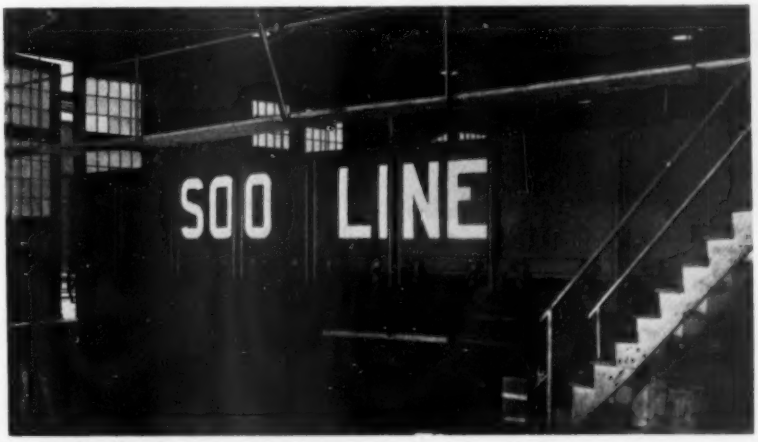
Three Cars per Day

Using this system, the railroad is able to achieve a total production of three cars per day. No one has ever bothered to measure the total number of linear feet of welds that go into a car, but it can be safely estimated at several thousand. A total number of 61 weldors work three shifts per day in 'round-the-clock production.

When the order of 200 gondola cars has been completed, the railroad's car-building shop is scheduled to start work on 100 ore cars. When these are done, 500 boxcars will follow. It looks like the weldors who work for the Soo Line in North Fond du Lac will be busy for a long time.

* * *

The writer would like to express his indebtedness to L. R. Kassick, superintendent of freight cars, I. L. Hancock, shop superintendent, and Fred J. Elsner, car foreman, all of the Soo Line, for the information in this article. He would also like to thank George J. Davies, service engineer, mechanical department, Oxweld Railroad Service Co., and Jack Hunter, Minneapolis sales representative of Oxweld, for their wholehearted cooperation.



9—COMPLETED: One of the last steps was to stencil Soo Line insignia

2 ANOTHER complete timing unit is immediately substituted for the timer taken off control panel

3 ELECTRONIC expert in maintenance repair shop takes timer to pieces to find what the trouble is

Timer Maintenance at Ford Motor Co.

1 MAINTENANCE employee starts to remove a sequence weld timer

SEQUENCE welding timers are handled as complete, interchangeable units at the Ford Motor Company's Dearborn stamping plant, Dearborn, Mich. Welder downtime is kept to a minimum by this procedure as one of these interchangeable timing units can be installed in a control panel in very few minutes.

HERE'S HOW THEY DO IT

Let's say that something goes wrong with a timer. It is removed as a unit from the control panel, and a timer of the same type is immediately put in its place. The timer that had failed to function properly is delivered to the electrical repair shop of the plant maintenance department. Here electronic specialists tear it down and diagnose the cause of trouble. Since the welder is already back in service, there is no "rush" pressure, and each job may be handled as it comes in. When repairs have been completed, the timer is reassembled, tested and placed in standby storage.

The four pictures tell the story. In photo 1, a welder maintenance employee is getting ready to remove an electronic sequence timer from a welding control panel. This particular panel serves a welder that seam welds the two halves of the gas tank of a Ford passenger car.

In photo 2, we see how another timer is substituted for the ailing timer in the control panel.

In photo 3, the timer is undergoing repairs. The electrical shop specializes in such elements as electronic tubes, condensers, coils, resistors, relays, rectifiers, fuses, switches and motors. Anything wrong is quickly found and fixed.

4 REPAIRED timer is put in storage cabinet until needed

GOES INTO STORAGE

In photo 4, the timer is about to go in the replacement cabinet in the storage room. The cabinet provides storage space for 15 different types of interchangeable timers. Repaired and tested, the timer is now ready for installation in another welding control panel whenever an emergency occurs.

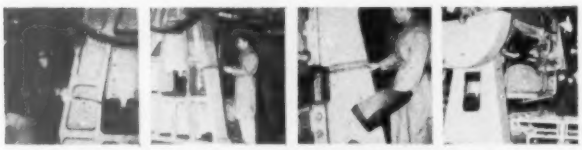
stop CAST IRON brazing & welding failures . . . minimize stress, distortion, warpage with

Low Temperature
EUTECTIC
WELDING ALLOYS

Impossible? That's what the "Steelbilt Company" thought, too, until they actually tried these new entirely different EUTECTIC Low Temperature. WELDING ALLOYS.® Then they came up with the astounding "Case History" shown on the left.

Yes, we not only *claim* this amazing performance — we *prove* that "EUTECTIC" is different . . . *prove* that these new alloys solve metal-joining problems where conventional materials fail!

Let us prove it in YOUR shop, just as we have in over 78,000 other plants and shops throughout America. There's no cost, no obligation involved. Just fill in and mail the coupon, below, for a FREE Consultation-Demonstration from one of our 350 trained District Engineers who stand ready to serve you from coast to coast. **Prove to yourself that there is something new and different in metal-joining . . .**



"IMPOSSIBLE" REPAIR AVOIDS TWO YEAR SHUT-DOWN

"The folding press shown in the photos had been in service a great many years and during that time, cracked one leg of the side frame. Temporary repairs were unsuccessful and cracking of two other legs occurred, making the machine unusable.

After various welding companies had decided against repairing this machine by *any* welding method, we called for a EUTECTIC Consultation and were told that the repair *could* be made with EutecTrode 24, your special electrode for welding cast iron "cold".

As recommended, we supported the weld repair by boxing in the complete side frame with steel plate and attaching the closely fitted plate to the frame with fitted bolts. The repair made in this manner was *completely successful* and the machine now operates as efficiently as a new unit.

An idea of the enormous savings we realized by using your unique welding alloys can be had when we tell you that quoted delivery on a new machine was at least two years!"

—Steelbilt Co.*

*Full name and address on request.

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"Manual of Welding Design and Engineering" with 50 new photos, 60 new drawings. Send for YOUR free copy TODAY.

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take THIS WELDER right to the job

Anywhere

with all the power you need

● POWER TO WELD ● POWER FOR LIGHTS ● POWER FOR TOOLS AND OTHER EQUIPMENT

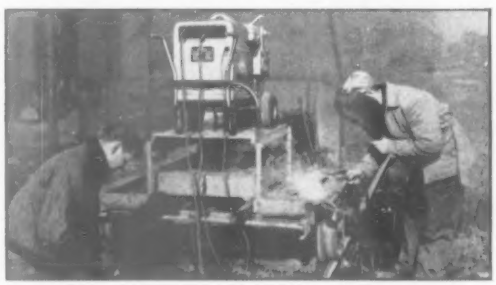
LOW OPERATING COST — LOW MAINTENANCE COST — LOW INITIAL COST — WEATHERPROOF CONSTRUCTION — DELIVERS A FULL 200 AMPERES — WILL HANDLE A.C. OR A.C.-D.C. ELECTRODES FROM 1/16" TO 1/4" INCLUSIVE.

An arc welder and power plant combined — so compact and easily portable that you can take it right to the job — anywhere. The MILLER Model AEA-200-L is a high cycle, high efficiency A.C. generator that gives you all the advantages of A.C. welding.

One KW of auxiliary D.C. power to operate lights and universal power tools available while welding.

It is also an emergency power plant. The change from welding to power can be made quickly and easily with the convenient change-over switch. The power furnished is identical to standard 60 cycle A.C. power supplied by electrical service lines. All standard electrical appliances within the power rating (3 KW, 110/220 volts) can be operated.

The MILLER AEA-200-L is the only welder of its kind on the market today ... its exclusive features warrant your immediate investigation.



Illustrations show only two of the many uses of the MILLER AEA-200-L — right on the job on one of the widely known railroads of the Northwest and in building construction.

Write today for complete details and the name of your nearest MILLER distributor.

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MANUFACTURERS OF A QUALITY WELDER LINE SINCE 1929

ARC ⚡ SPOT miller GENERATORS WELDERS

Safe Working Pressures for Tubing

INTERNAL WORKING PRESSURES FOR SEAMLESS STEEL TUBING (SAFETY FACTOR - 6)

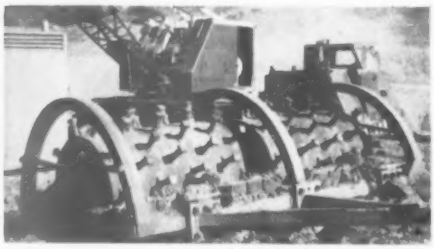
Wall Thickness	TUBE SIZE																
	2	3	4	5	6	7	8	9	10	12	14	16	18	20	24	28	32
.030	3840	2560	1920	1540	1280	1100	960	855	770	640	550	480	425	380	320	270	240
.035			2240	1790	1490	1280	1120	1000	895	750	640	560	495	450	370	320	275
.040			2560	2050	1710	1460	1280	1140	930	850	735	640	570	520	425	365	320
.050			3200	2560	2130	1820	1600	1420	1280	1070	910	800	710	640	535	460	400
.060			3840	3070	2560	2200	1920	1710	1540	1280	1100	960	850	770	640	550	480
.065			4160	3330	2770	2380	2080	1850	1670	1390	1180	1040	920	830	695	590	520
.070			4480	3580	2990	2560	2240	2000	1790	1500	1280	1120	995	895	745	640	560
.075			4800	3840	3200	2740	2400	2130	1920	1600	1380	1200	1070	960	800	680	600
.080			5120	4100	3420	2920	2560	2270	2050	1700	1460	1280	1140	1030	855	730	640
.090				4610	3840	3300	2880	2560	2300	1920	1640	1440	1280	1150	960	820	720
.095				4860	4050	3480	3040	2700	2430	2030	1740	1530	1350	1210	1020	870	760
.100				5120	4270	3660	3200	2850	2560	2130	1820	1600	1420	1280	1070	910	800
.110					4700	4020	3520	3120	2710	2350	2020	1760	1570	1410	1120	1000	880
.115					4900	4200	3680	3280	2940	2450	2100	1850	1630	1470	1230	1060	925
.120					5120	4400	3840	3410	3080	2560	2200	1920	1700	1530	1280	1100	960
.130							4160	3700	3330	2770	2380	2080	1840	1660	1390	1180	1040
.140							4480	3980	3580	2990	2560	2240	1990	1790	1490	1280	1120
.150							4800	4270	3840	3200	2740	2400	2130	1920	1600	1380	1200
.160							5120	4560	4100	3420	2920	2560	2270	2050	1700	1460	1280
.165									4220	3520	3020	2640	2340	2110	1760	1500	1320
.190									4860	4060	3480	3040	2700	2430	2030	1740	1520
.210										4480	3840	3360	2980	2690	2240	1920	1680
.225										4800	4120	3600	3200	2880	2400	2060	1800
.260											4760	4160	3700	3330	2770	2380	2080
.300												4800	4260	3840	3200	2750	2400

Courtesy V. L. Graf Company

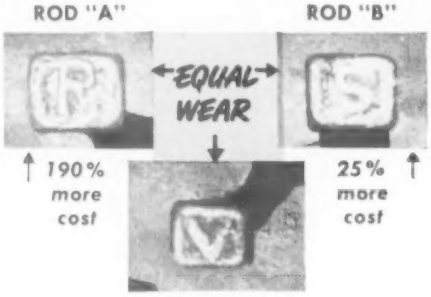
"test it yourself" plan

PROVES VICTORALLOY CUTS HARDFACING COSTS

HERE'S EASY WAY TO MAKE TEST... Hardface an equal number of "feet" on a sheep's foot tamper, as this contractor did, with the different rods you want to test. (You could use bucket teeth or tractor rollers for the test, too). Position test teeth so each sample gets equal wear. Identify each rod by welding a symbol on its test samples.



MAKE A TEST "RUN", then check results. These unretouched photos show what *this* test revealed: equal wear, yet rod "A" cost 190% more, rod "B" 25% more than VICTORALLOY!



VICTORALLOY'S wearing qualities, ease of application and low cost saved this contractor a minimum of 25% in hardfacing cost!

Test VICTOR Hardfacing Rods . . . And Start Saving NOW!

THIS HARDFACING ROD	FOR THESE CONDITIONS	FOR SUCH EQUIPMENT
VICTORALLOY	Abrasion and severe impact	Tractor rollers, dredge pump impellers, bucket lips and teeth, rock crushers, steel mill wobblers
VICTORTUBE	Severe abrasion	Scarifier teeth, dredge cutter blades, posthole augers, oil field tools, ditcher teeth
VICTORITE	Earth abrasion or sliding friction	Plowshares, cultivators, steel mill guides, cement chutes, shaft bearings, rolling mill guides
VICTORITE 1	Corrosion, heat and abrasion	Saw-teeth, carbon scrapers, wire guides, rocker arms
VICTORITE 6	Red heat, impact, corrosion and abrasion	Blanking, forming and trimming dies; cams, hot punches, pump shafts
VICTOR TUNGSMOOTH	Thin cutting edges	Coal cutter bits, brick augers, pug-mill knives, screw conveyors

Available in a full range of sizes for both acetylene and electric AC and DC applications, either hand or automatic. Order a supply from your VICTOR dealer today . . . look for this sign.

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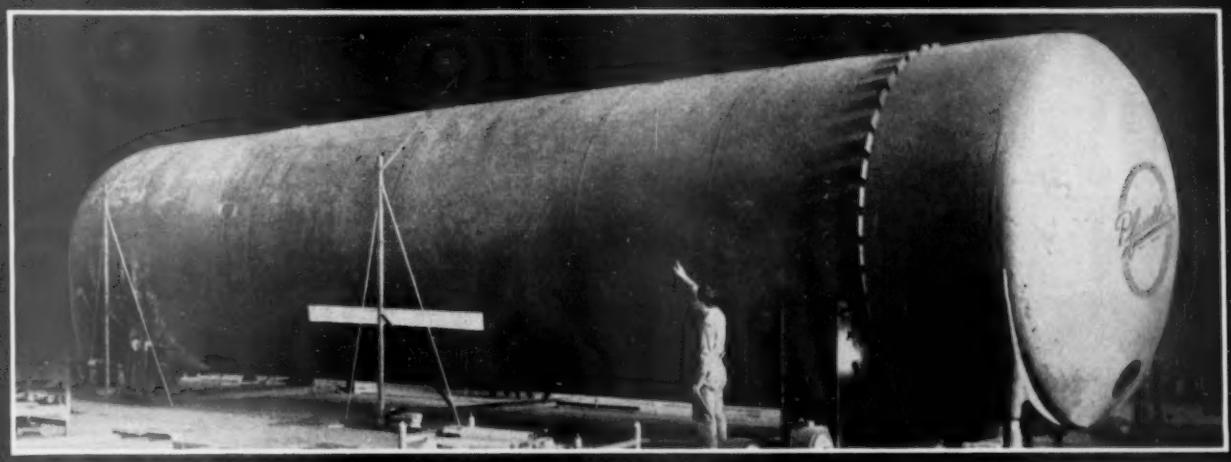
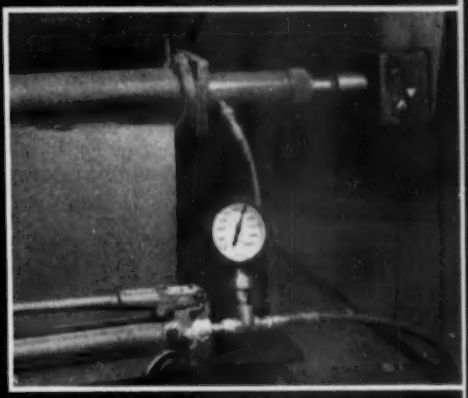


Welded, glassed steel tank 12' x 54'; capacity 1426 barrels.

Radiography helps protect the quality in 1,000,000 GLASSES OF BREW



Sound welds enable tank's legs to withstand 30,000 p.s.i. thrust test.

THIS GIANT glassed steel tank will store beer to fill one million glasses . . . store it safely and protect its quality in storage.

Thanks to radiography, its seams are sound, expertly welded to accept a lasting bond between steel and glass liner.

Thanks to radiography, its welded legs are sturdy—tested to withstand 30,000 p.s.i. That's 70% in excess of the code requirements in far western earthquake areas.

All this points up two important ways that radiography helps extend the use of welding: It helps to check and to develop welding skills and technics; it proves welds sound.

Radiography can help you get more business—build a reputation for high quality work. If you would like to know how, talk it over with your x-ray dealer.

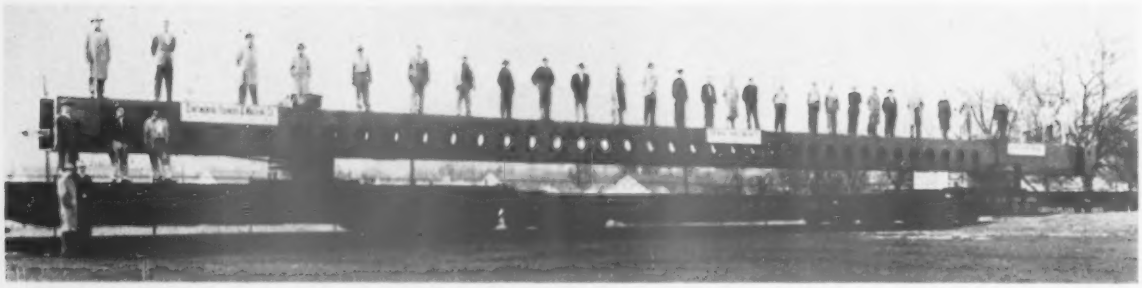
EASTMAN KODAK COMPANY
X-ray Division, Rochester 4, N. Y.

Radiography . . .

another important function of photography

Kodak
TRADE-MARK

on the job



STRETCHER-column on arrival at Lafayette, Ind. This mammoth weldment is 138 ft long and weighs 123 tons

Stretcher for Aluminum

Aircraft parts of the future will literally be pulled back into shape with a giant "stretcher," now being erected at the Lafayette (Ind.) Works of the Aluminum Co. of America. Capable of exerting a 3,000,000-lb pull, the stretcher will be used to straighten and relieve strain in large aluminum extruded parts.

The parts will be made on two extrusion presses of 14,000 and 20,000 tons capacity at the Lafayette Works. During the extruding process, large pieces of metal have a tendency to warp or curve, and internal strains are built up. The stretching operation removes the warps and thus insures freedom from residual strains.

Two huge assemblies of welded steel plates will form the bed of the stretcher. Recently, one of these arrived at the Lafayette plant. This single piece of steel (see illustration) is 138 ft long and weighs 123 tons. From its fabricator, near Philadelphia, it was shipped to East Chicago for machining. From the Chicago area, the stretcher had to go hundreds of miles out of its way into Ohio and back by another route in order to avoid as many sharp curves as possible. The large weldment was loaded on three railroad flatcars, which were permitted to travel only during daylight hours at 25 miles-per-hour or under.

The completed stretcher will be about 180 ft long and 5 feet wide with a total weight of about 1,050 tons. It will be capable of handling pieces of metal up to 110 ft in length and of straightening shapes of one of the strongest aircraft alloys, 75S, that has a cross-sectional area of as large as 60 sq in.

The 3,000,000-lb pull that this big machine can exert is equivalent to the pull of 38 Diesel locomotives. Extra safety allowances had to be built into the stretcher. If a piece of metal should break while under maximum tension, it could fly off at 1,900 inches per second (better than a hundred miles an hour) because of the kinetic energy stored in the metal during the stretching period. The tremendous energy of 17,000,000 inch-pounds has to be absorbed in the stretcher itself in case of a break. During the stretching operation, the pull on the machine is so great that the stretcher-column may shorten as much as $\frac{3}{8}$ of an inch.

This stretcher, designed by Alcoa engineers, is the largest known to be in existence and will have four times the force of any existing stretcher. It is to be put on a foundation of 1,500 cu yd of concrete reinforced by 23 tons of steel reinforcing bars and with 12 tons of steel floor plate. Nine tons of aluminum tread pontoon bridge sections are used for walks to provide working access to the big machine.

* * *

Cool Drink

By Lon Fanald

THE Gerlinger Carrier Co., of Dallas, Oregon, which started in business years ago as a machine and welding shop, has found that coolers dispensing a nationally advertised beverage make for more contented employees. These coolers serve 250 employees and dispense over 1,500 cases of the beverage a year.

All of the profits go into an employees' fund, which is used to help pay for employee activities, including the employees' annual salmon fishing derby.

"When the first cooler was installed four years ago," V. O. Williams, manager and executive vice-president of Gerlinger, informed the writer, "we didn't know what was the best management procedure. So we called in a representative of the bottling company and had him talk to our employees. It was then suggested that the employees organize a committee and take over the details and decide what should be done about the profits. They decided that the profits accruing from the operation of the cooler be used to help sponsor various employee activities."

Soon after the first cooler was installed, a second one and then a third was put in. Employees are not limited to the morning and afternoon break; they may go to the cooler for a bottle whenever they wish. This has proved a wise decision.

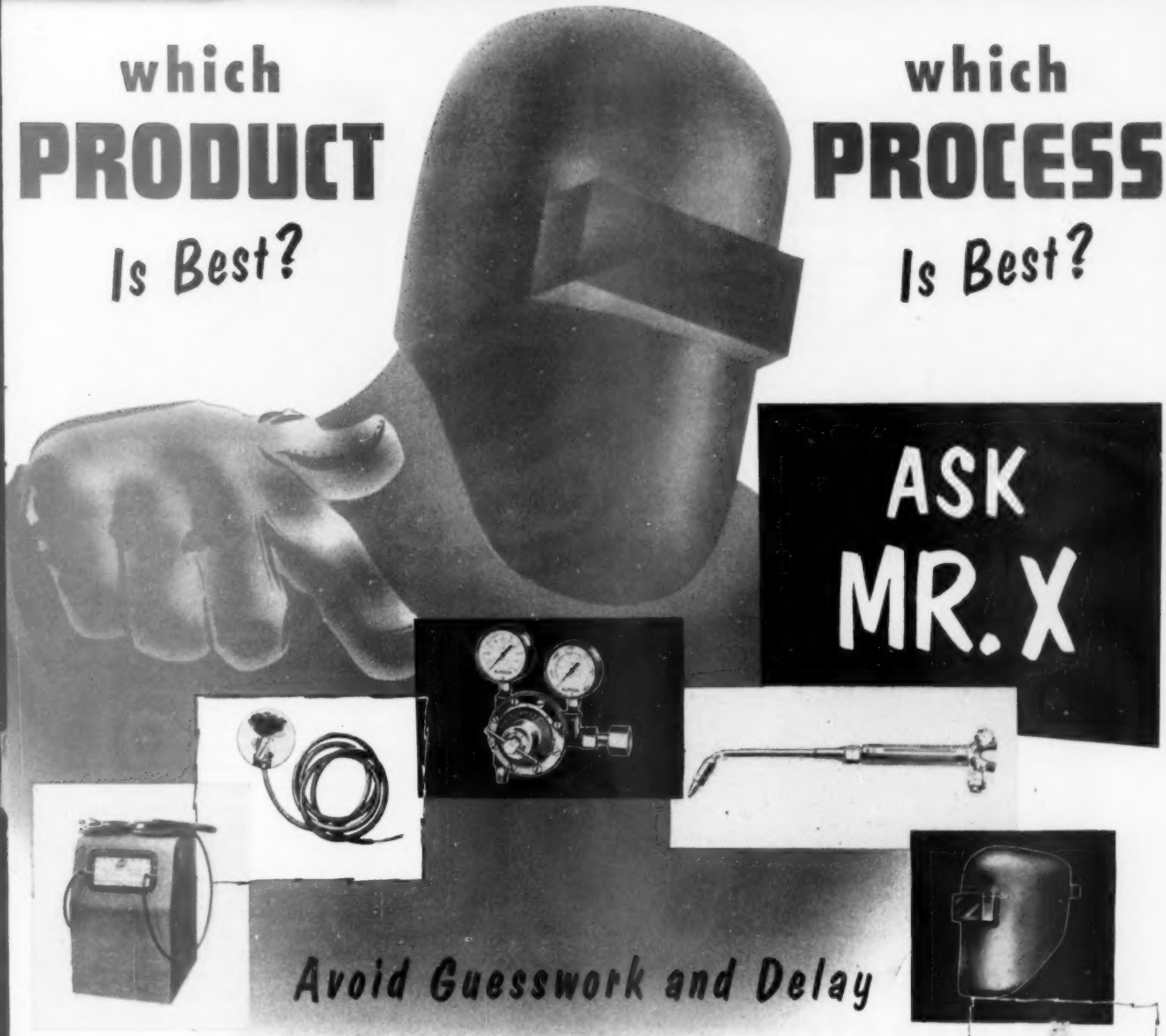
"We are finding," Mr. Williams said, "that a short break while the employee refreshes himself accounts for better work afterwards, and, I think, more work. I know that it has accounted for a great deal less away-from-work time because now very few of our employees leave the shop to go out after refreshments at any time.

"Employee-managed coolers have greatly boosted morale at our shop."

EMPLOYEES of Gerlinger Carrier Co. can help themselves to a cold bottle whenever they feel like it

which PRODUCT Is Best?

which PROCESS Is Best?



Avoid Guesswork and Delay

Mr. "X" is not one individual—rather he represents the collective experience and "know-how" of Burdox welding men. This "know-how" is the result of years of working in close harmony with companies having all types of welding problems — using all types of equipment on all types of jobs. Mr. "X" is not partial to any particular welding process . . . he is an expert in all of them and therefore in a position to suggest the best possible products *for your particular needs*.

When you buy Burdox you not only get the finest welding and cutting equipment that money can buy, but you engage the services of our Mr. "X". He will work with your workers . . . increase your output and stretch your welding dollar!

Get acquainted with the complete Burdox line — write for FREE catalog.

BUY BURDOX top quality industrial gases

BUY BURDOX gas welding and cutting equipment

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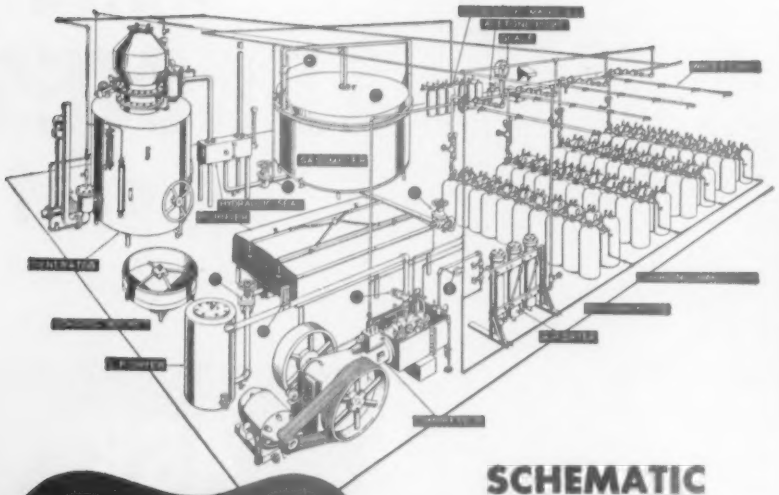

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ACETYLENE
PRODUCING
PLANT
that Charges up to
160 CYLINDERS
at ONE TIME

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SHOWING LOCATION OF UNITS
THAT MAKE UP THE PLANT

This plant layout provides simplest operation at low production costs. Compact design allows operator to watch all operations at all times.

LOW PRESSURE
GENERATOR

This 600-lb. acetylene generator fits into the above plant assembly. It stands out as one of the safest plants manufactured. Automatic controls minimize operating personnel. Rated capacity of the generator and plant assembly is 2700 cu. ft. per hour. The other units are designed for maximum production at minimum costs.

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Courtesy Linde Air Products Co.

TIG-WELDED chair for an ocean liner — the S.S. *United States*

Welded Deck Chairs

BARCALO Manufacturing Co., of Buffalo, N. Y., was given an order for 1,200 aluminum deck chairs, like those in the above picture, to be used aboard the S.S. *United States*. The chairs had to be lightweight, strong and had to be delivered quickly. In order to meet these time and quality specifications, the manufacturer used Tig (tungsten inert-gas) welding.

The chairs were fabricated from extruded aluminum tubing, 1½ in. by ⅞ in. by 5/64 in. thick. The metal was prepared for welding by deoxidation in a solution bath. The pieces were clamped in a special jig, and the operator used an argon-shielded tungsten electrode to make the necessary butt and seam welds.

There were 16 ft of welds per chair. Total welding time for each chair was 1 hour. The welds were clean and required little finishing. After welding and grinding, the chairs were "alodized" and given a coat of corrosion-resistant paint.

* * *

Saving by Spot Welding

TWO RESEARCH laboratory analysts at Ryan Aeronautical Co., San Diego, Calif., devised a new system for welding retainers on port nipples for the exhaust systems of aircraft engines used in DC-6 transports. The job is to weld three retainers to the flange of the assembly. The old system required four operations: clamping, arc welding, disassembling of locating pins and grinding. The new system requires only spot welding and does the job in about a quarter of the time. Laboratory analysts Steve Dever and Bob Ogier are the bright boys who spotted this potential saving.

SIMPLIFY Your Shape-Cutting Jobs with the . . .

OXWELD Automatic Tracer

Trade-Mark

- Positive templet contact . . electronic steering control . . . maximum tracing accuracy
- Templets are easy to make, low-cost
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- Dynamic braking prevents overruns
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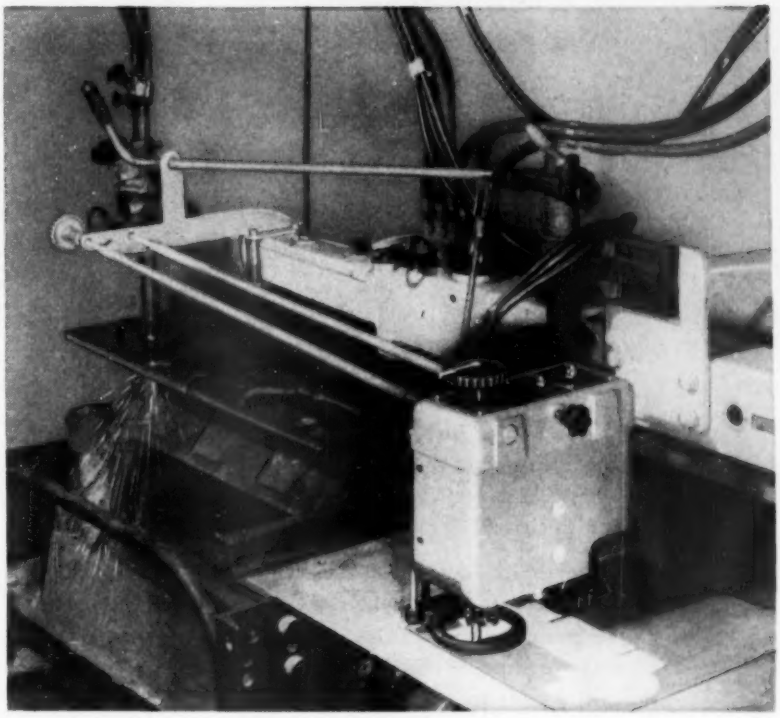

With an OXWELD Automatic Tracer to guide your oxygen-cutting machine, you need never forego the advantages of templet tracing because of time or cost. Whatever the shape—whether you need one piece or many—templet requirements are simple. Just draw your templet, full size, on a thin sheet of inexpensive plastic. Then cut it out with scissors or knife. It's that quick and easy. There's no tedious forming. To compensate for kerf width, just set a handy dial on the Tracer.

The OXWELD Automatic Tracer follows practically any templet shape within extremely close tolerances. It can also be used to hand trace directly from blueprints or drawings. Drive action is smooth and steady with both single- and multiple-blowpipe setups.

Your nearest LINDE representative will be glad to help you plan an OXWELD Automatic Tracer installation to fit either your present shape-cutting machine or one of the available OXWELD Shape-Cutting Machines.

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Linde
TRADE-MARK

LINDE AIR PRODUCTS COMPANY
A Division of Union Carbide and Carbon Corporation
30 East 42nd Street UCC New York 17, N. Y.
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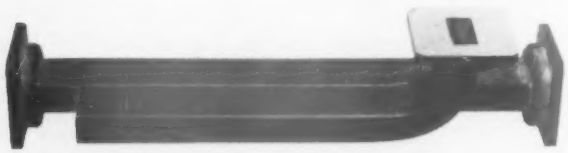
The terms "Linde" and "Oxweld" are registered trade-marks of Union Carbide and Carbon Corporation.

EASY-FLO 45

With its low working temperature of 1145° F, EASY-FLO 45 is just what the doctor ordered for joining thin gauge metals. It brazes them without danger of damage from overheating. The low flow point also cuts a big chunk off heating costs.

And here are more good reasons why this silver brazing alloy is so widely used for joining thin gauge metals. EASY-FLO 45 is exceptionally free flowing. Because of this it penetrates into and over the entire joint area the instant its low flow point is reached. Results—high strength, liquid and gas tight joints—joints so clean they seldom need finishing. Here's a sample — a directional coupler from the line of microwave test equipment made by the Polytechnic Research & Development Co. Inc., Brooklyn, N. Y.



Curved and straight sections of rectangular brass tubing are brazed along a common side wall and flanges are attached with 1/16" EASY-FLO 45 wire. Bodies are finished with baked gray enamel and flanges are nickel plated. The clean EASY-FLO 45 joints greatly facilitate finishing.

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CINCINNATI MEETING

(Continued from page 29)

to do during the next few months.

Factors cited as definitely bullish are: the high rate of defense spending, $51,500,000,000 a year; the high rate of expenditure for capital equipment and construction; consumer spending; the Federal deficit and treasury policy.

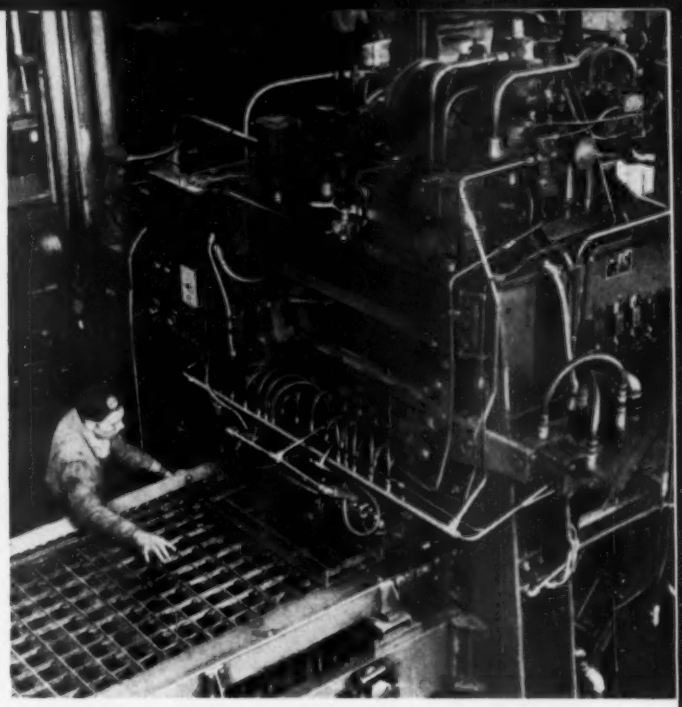
On the bearish side: defense spending is leveling off from the high plateau; price structures are definitely weak; $176,000,000,000 has already been spent for new plants since 1945; inventories are tightening instead of accumulating.

At the same meeting, James N. Alcock, of Saginaw Welding Supply Co., Saginaw, Mich., reported for the association's catalog committee, and R. P. Tarbell, of Scott-Tarbell, Inc., Cleveland, reported as chairman of the manufacturers' relations committee. The standardization of catalogs, as recommended by Jim Alcock's committee, will be to everyone's advantage. It will save mistakes, make for a better presentation, is less costly, saves time, the size is suitable for filing and identification tabs can be installed easily.

After these committee reports, the new officers and directors were installed (see list on page 27). The president of the association is now William A. Rice, better known as "Bill" to his friends and associates. Rice heads the Virginia Welding Supply Co., Charleston, West Va., one of the country's oldest welding supply houses. Mr. Rice's father, the late V. S. Rice, started the business in 1916. The senior Rice was also one of the spark plugs in the organization of the National Welding Supply Association, so it is highly gratifying that his son is carrying on the Rice tradition.

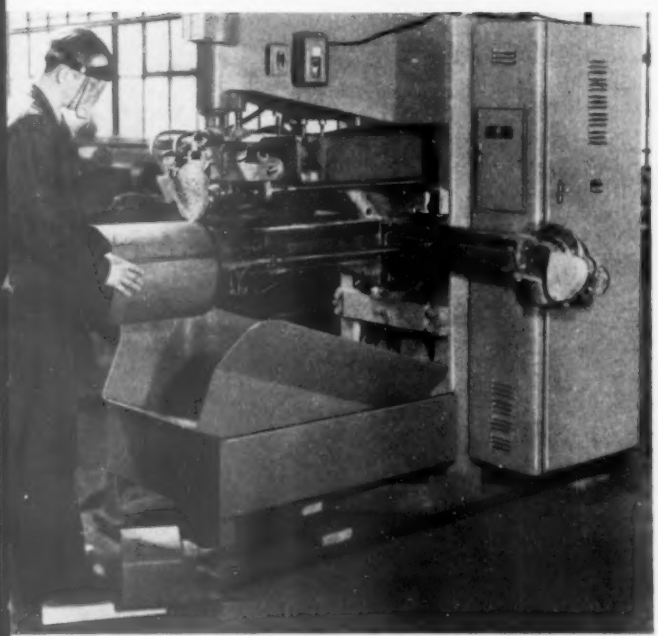
Next Year San Francisco

The next annual meeting will be held in San Francisco, probably in February of 1954. With this announcement, the 1953 meeting came officially to an end. On Wednesday afternoon, however, the space utilized for contact booths was taken over by a group of business machine manufacturers. Many NWSA members stayed on to witness demonstrations by trained crews of the latest office machines and equipment.



TINY DIODES OR GIANT LANDING MATS . . .

G-E Resistance Welding Controls Cut Rejects, Speed Production



COMPLETE LINE of G-E control includes synchronous-precision, nonsynchronous, three-phase and all special-purpose accessories for all standard spot, seam, combination, or bench welders.

One manufacturer welds delicate germanium diodes so tiny that operators look through magnifying glass to see them (above, left). Another fabricates huge landing mats with a giant multiple-electrode welder (above, right).

BOTH MANUFACTURERS use General Electric controls, as do hundreds of other metal fabricators.

NO MATTER WHAT materials or product you're welding—whether accuracy or speed or a combination of the two is your major requirement—specify G-E control on your resistance welding equipment.

FOR MORE INFORMATION, contact your nearby G-E Apparatus Sales Office or your welding machine manufacturer or his agent, or write:

Section B785-5, General Electric Company
Schenectady 5, New York.

Please send Bulletin GEA-5816, "The Story of Resistance Welding," which gives the how's and why's of resistance welding and a description of G.E.'s complete line of controls.

NAME_____ TITLE_____

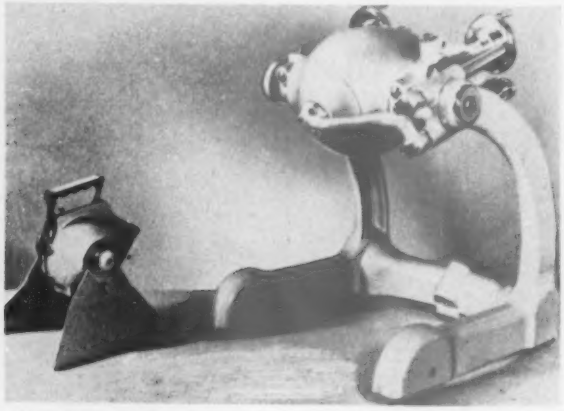
COMPANY_____

ADDRESS_____

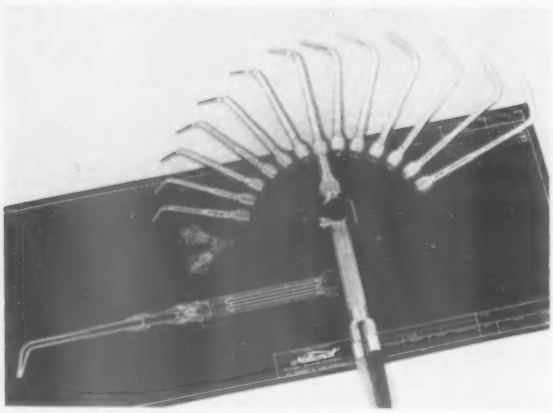
CITY_____ STATE_____

GENERAL ELECTRIC

New Products . . .



STREAMLINED machines house Cobalt-60 for handy industrial radiography. Operator can stay within 3½ ft



LIGHTWEIGHT oxyacetylene torch for aircraft and other light gage work has a variety of rotating tips

Gamma Ray Machine

Two models of gamma ray machines are now available for use with Cobalt-60 and other radioactive isotopes. The Model A machine weighs 47 lb, stands 11-in. high and occupies ½-sq ft of floor area. It has a capacity of 300 millicuries of Cobalt-60. It is designed and shielded so that when loaded to maximum capacity, the operator can be as close as 3½-ft to the rear of the machine.

For larger weldments and castings, the Model B machine is semi-portable and weighs 190 lb. It occupies 2½-sq ft of floor area. Its capacity is 5 curies of Cobalt 60. As with the smaller model, the operator can stand within 3½ ft of the rear of the machine.

Gamma Industries Inc., P. O. Box 2271, Baton Rouge, La.

* * *

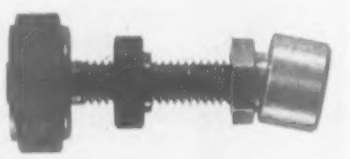
Lift-Front Helmet

A new Jackson lift-front welding helmet has a rugged, molded plastic lens holder. Filter lens and clear cover glass fit in the holder which swings up to permit inspection of work without raising the entire helmet. Another clear glass stays in place to protect the eyes.

The helmet shell is one-piece, thermosetting plastic reinforced with glass fibre. The headgear has wide, flexible straps made of smooth easily cleaned plastic. Adjustable and calibrated to half sizes, it has a replaceable cork padded sweatband. Friction pivots can be adjusted to let the helmet float down or to stay in any desired position.

Jackson Products, Warren, Mich.

* * *



Toggle Pads

Handy, new toggle pads fit almost any type of welding clamp to make it self-aligning and leveling. The Vlier-designed pad has a 20-deg combined movement for permitting adaption to uneven or off-angle surfaces. Each tool has a "jamming" feature to prevent loosening during work.

As shown in the photo above, the toggle pad (at right), can also be combined with Vlier torque thumb screws (at left, above) for achieving controlled end pressures on work pieces. Other Vlier products for stepping up jig, fixture and die work are spring plungers, fixture keys and spring stops.

Vlier Engineering, Inc., 4552 Beverly Blvd., Los Angeles 4.

Aircraft Torch

Specially designed for the light gage work in the aircraft industry and for nonferrous applications generally, a new National Model 30 torch is on the market. It features light weight and good balance, specially needed in the welding of aluminum. All valves are said to be easily adjusted and maintain accurate seating. Tips with accurately graduated orifice diameters provide a full range of flame sizes. A new tip design permits rotation in any desired direction during welding. The multi-mixer is said to prevent popping or blowing.

National Welding Equipment Co., 218 Fremont St., San Francisco 5.

* * *

Hose Measuring Reel

Both hose and welding cable can be measured and cut easily with the "Marvel" measuring reel. It handles the largest sizes of dual welding hose or cable (more than 250 ft of the latter). Parts for the machine may be purchased separately or in combination, ready for mounting.

J. M. Ragle Industries, 4029 Indiana Ave., Kansas City 4, Mo.

* * *

Iridium Radiography

Iridium-192 radioactive sources for testing steel ¼ to 1-in. thick are now available. The iridium source is said to give 2% definition in above-named range of thickness in steel and to also give good results on aluminum and magnesium. Standard source strength is 1.25 curies.

Tracerlab Inc., 130 High St., Boston 10, Mass.

D-C Welder Parallel

To facilitate operation of any number of Miller rectifier-type d-c welders in parallel, Model SRSM control units are now available. Housed in a neat metal cabinet (see photo above), the control includes a primary contactor of sufficient rating to adequately handle 3 phase primary current of a ½-kva control transformer for operating the contactor and cooling fan motor and supplies energy to the current control circuit. Suitable interlock switch furnishes finger-tip control over the various welders in the paralleled hook-up. An SRSM control is required for each welder to be operated in a parallel set-up. Two sizes of controls are made, the smaller to fit the Miller SR-100, 200 and 300 Model welders and the larger the SR-400 and 600 models.

MILLER ELECTRIC MFG. CO., Appleton, Wis.

* * *

New Goggle Line

A NEW line of comfortable safety goggles and spectacles for all industrial eye hazards includes models for welding, chipping, grinding, impact, cutting, and special constructions for dusts and chemicals. Spectacles come in metal or plastic frames, with or without side frames. Some types fit over prescription glasses.

PULMOSAN SAFETY EQUIPMENT CORP., 644 Pacific St., Brooklyn 17, N. Y.

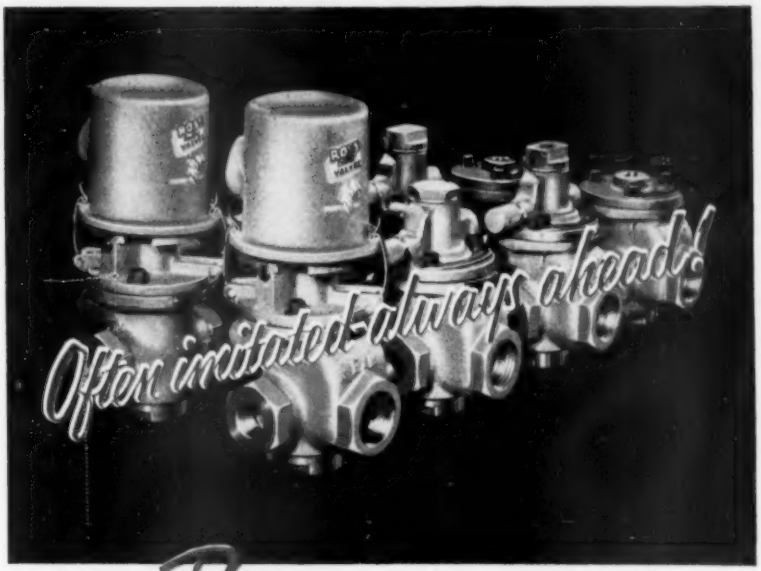
* * *

Dust Collector

To provide for under-workbench placement, side panel exhaust is now available on several small model Torit dust collectors. They provide efficient recirculation of the cleaned air where the most practical location for the dust collector is beneath a bench. The Model 66 stands only 33 in. high, will handle the dust from several small grinding wheels.

TORIT MFG. CO., 270 Walnut St., St. Paul 2, Minn.

IF IT'S A VALVE
FOR WELDING—
ROSS HAS IT



Ross In-line Valves

The reputation and performance of Ross In-line Series Valves are so outstanding that imitations are constantly being attempted. Through constant improvements, the Ross In-line Series remains the leader and the envy of the trade. Here's why—

- Dependable—10 to 20 million maintenance-free cycles, and many more tens of millions of life-cycles, are not uncommon.
- Speedy—split second operation; oversized exhaust.
- Low current consumption for solenoid models—inrush of 1.2 amps @ 110/60.
- Positive seal—poppet construction; Hycar seats.
- Easy maintenance—only a few moving parts; can be disassembled without breaking line connections — solenoids readily accessible.
- Many modifications—vacuum, air, and liquid service; various pressures; available for AC or DC solenoids or air actuation with or without sequence timing; interchangeable heads.

Write for full information on the Ross In-line Series

Ross OPERATING VALVE COMPANY
116 E. GOLDEN GATE AVENUE • DETROIT 3, MICHIGAN

Engineers at Your Service
in all Principal Cities

143-Lb X-Ray Unit

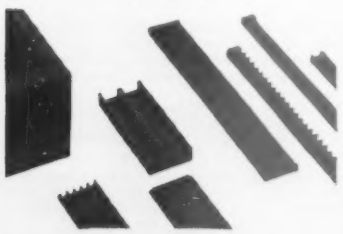
SMALL enough to fit in an auto trunk, the Norelco MG-160 portable industrial X-ray unit was specifically designed for rapid inspection of welds, pipe lines, power plant, ship and aircraft equipment. The accompanying control weighs 80 lb.

The fan-cooled X-ray tube has an end port to provide maximum usefulness in handling "close-in" work. Combination tube and 150,000 kvp generator unit has a diameter of only 10⅝ in. and is 35-in. long. Where desired, the diameter can be reduced to 8½-in. by eliminating the removable guards. Power supply can be either 115 or 230 volts a-c; current drain is 20 amp.

Norelco has recently brought out a completely new line of 150 and 300 kvp industrial X-ray units. A number of tubes and accessories are available for each of them.

NORTH AMERICAN PHILIPS CO., INC., 750 S. Fulton Ave., Mt. Vernon, N.Y.

* * *



Carbon Brazing Boats

INCREASING use of furnace brazing for assembling metal parts calls for a wide variety of carbon supporting "boats" or trays to hold the parts in place before the solder solidifies. A number of typical brazing boat designs are pictured above. They can be machined to almost any shape. Said to last indefinitely at high heats and to withstand several thermal shocks, metal doesn't stick to them.

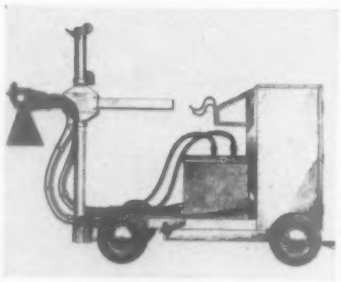
STACKPOLE CARBON CO., St. Mary's, Pa.

Interference Shield

FOR shielding certain types of welders that can cause radio interference a new wood-and-wire shield is on the market. It is made of standard size panels framed in white pine with galvanized steel screening stretched across the outer surface. Welders or other electrical equipment can be brought inside the structure. Its attenuation is at least 40 DB, according to an independent laboratory. It is said to permit compliance with Federal Communications Commission requirements at lowest cost.

ACE ENGINEERING AND MACHINE CO., 3644 N. Lawrence St., Philadelphia 40.

* * *



Mobile X-Ray Cart

AN approved 250-kv mobile X-ray cart is said to provide more flexibility and handling ease than former models. The operator can stand inside the cab because of additional radiation protection.

Wide inspection coverage is accomplished with a long vertical column and a horizontal tube-arm. Minimum tube-head-to-floor distance is 36 in. and the maximum 108 in. The vertical column can be rotated 360 degrees. The 250-kv constant potential transformer provides power for radiographing up to 4½-in. of steel.

WESTINGHOUSE ELECTRIC CORP., Section X., 2519 Wilkens Ave., Baltimore 3, Md.

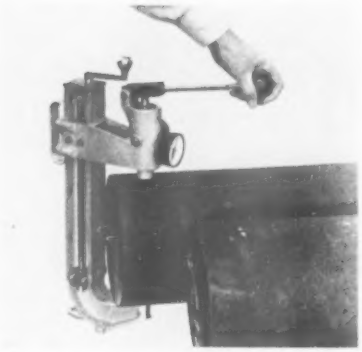
* * *

New Lincoln Electrode

EASY operation and high quality weld deposits are claimed for the Fleetweld 51, a new E-6010 electrode made by Lincoln. It can be used in the overhead or vertical positions.

Other uses include the welding of galvanized, dirty and rusty plates, welding pipe in all positions, applications requiring deep penetrations. Slag is light. Available in 14-in. lengths it comes in ⅛, 5/32 and 3/16 in. diameters.

THE LINCOLN ELECTRIC CO., 22801 St. Clair, Cleveland 17.



Portable Brinell Test

POSITIVE hardness tests can now be made in the field with the Blosjo "Porta-Brinell" tester. A special penetrator makes an impression at a controlled hydraulic force of 500 kg. The impression is read with a standard Brinell microscope and translated to hardness figures.

The tester has a 12-in. gap and a 4½-in. throat. Frame of the tester is of rigid I-beam construction but it only weighs 17 lb. The machine works in any position. The test piece is clamped between the cylinder housing and anvil.

BLOSJO ENTERPRISES, 5310 Golden Valley Rd., Minneapolis 22, Minn.

* * *

New Airco Electrode

AN improved E-6010 electrode has been brought out by Airco for the welding of mild steel in all positions. Named the Airco 78E, it is said to offer deep penetration without undercutting, a minimum of spatter and uniform weld deposits without fingernailing. Fast solidification of weld metal recommends it for vertical and overhead positions.

The 78E has been used to fabricate mild steel plate, rolled sections, castings, fired and unfired pressure vessels, structural frames, pipe lines and all classes of marine work.

AIR REDUCTION SALES CO., 60 E. 42nd St., New York City 17.

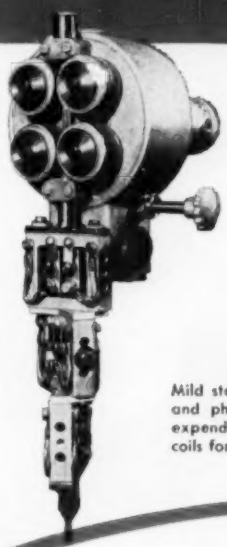
* * *

Aluminum Flux

A NEW fluxing compound, S-X "Aluma-Flux," is said to make possible the non-corrosive soldering of aluminum alloys (except some high-silicon alloys). It can also be used with stainless steel, galvanized and bare carbon steel, cast iron, copper, brass and nickel. It can be stored in powder form or maintain in molten form indefinitely, says the manufacturer. It is non-hygroscopic.

ESSEX WIRE CORP., 3435 Chouteau Ave., St. Louis 3, Mo.

Every Welding Need

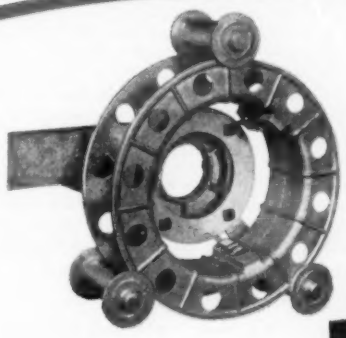


The Reid-Avery type 4R automatic head and control originally designed for Raco composite type A, may be used with equal success for lightly coated open arc or for submerged arc welding.

Raco composite Type A heavy coated automatic (open arc) electrodes, a "Reid-Avery" first, can be furnished in all mild steel, low alloy high tensile, low hydrogen, hard surfacing and stainless steel grades.

Mild steel, alloy steel, stainless steel, aluminum and phosphor bronze wire are available on expendable wooden spools or in layer wound coils for gas shielded arc welding.

The Raco "free-reeling" reels are especially designed for high speed automatic machines. The ball bearing trunnions enclose the coil so there is no over-run or loose strands and larger coils can be used. Changing coils is a matter of only a few seconds and no tools are required. Available in 12, 14, 25 and 36 inch sizes, for any weight from 50 to 200 lbs.



The Raco coils of wire for submerged arc welding have long been known for their uniform high quality and convenient, easy to handle package. Special attention is paid to the accurate weight, lay and temper of the wire so that the wire will accurately follow a seam. Available in mild steel, alloy steel and stainless steel.

Since 1919 Reid-Avery Company has specialized in the manufacture of all types of welding electrodes and wire. The large modern plant in Baltimore is equipped for wire drawing, annealing, pickling, coating, cutting, winding and packaging. Every phase of welding electrode and wire production is completely controlled from start to finish. You can be assured of uniform high quality and the best possible deliveries.

We also manufacture a complete line of manual electrodes in the following grades:
Raco Mild Steel, Raco Low Alloy High Tensile, Racocast for nonmachinable welds on cast iron, Raco Feral for welding aluminized sheets, Raco Low Hydrogen, Raco Hard Surfacing, Racolloy Stainless, Racolloy Nickel and Nickel 60 for machinable welds on cast iron.

The REID-AVERY COMPANY
INCORPORATED
DUNDALK • BALTIMORE 22 • MARYLAND
SINCE 1919 PRODUCERS OF ARC WELDING ELECTRODES AND WELDING RODS

NO MATTER WHAT METALS...

there's a GB silver brazing alloy and flux combination that will *Speed Your Production!*

SILVER
COPPER
BRASS
STAINLESS STEEL
BRONZE
STEEL
NICKEL
CHROME ALLOYS
GOLD
TOOL STEEL
CARBIDE
INCONEL
ETC.

Every day more and more fabricators are learning that GB Silver Solder with GB Flux makes an unbeatable production team for low temperature brazing.

From the GB line of six standard silver solders you can select the one which will fully meet your production specifications. Yes, with GB Silver Solders you get sound, low-cost joints on virtually any ferrous or non-ferrous metal.

GB Standard Silver Solders:

GB No. 50 Silver Solder, melting range 1160-1175°F
GB No. 50N Silver Solder, melting range 1240-1260°F
GB No. 45 Silver Solder, melting range 1125-1145°F
GB No. 41 Silver Solder, melting range 1125-1160°F
GB No. 35 Silver Solder, melting range 1130-1270°F
GB No. 31 Silver Solder, melting range 1130-1300°F

For special jobs where special silver solders are required, GB offers you competent technical assistance, backed by over 80 years of experience in alloying and refining precious metals.

GB FLUXES

The physical properties and appearance of a brazed joint are controlled to a large degree by the flux which is used. For this reason it will pay you to team-up GB Flux with GB Silver Solder — they were developed to produce maximum results when used together.

GB DATA BOOK

Here's real factual data on all of the important phases of low temperature brazing. You can get a free copy from your GB Distributor — Write us and a copy will be forwarded to you.

GOLDSMITH BROS. SMELTING AND REFINING CO.
1304 W. 59th Street, Chicago 36, Illinois
Suppliers of Precious Metals to Industry Since 1867

Welding Tip Rack

A HANDY rack for welding and brazing tips can be attached to the welding bench or near it, or on the cylinder truck. Tips are firmly held by friction in each holder but can be easily lifted out.

S & G RACK CO., Box 702, Williston, North Dakota.

* * *

New Hose Connections

No work benches or vises are needed to apply new Squire-Cogswell hose connections. All that is required is a hose tool and the bands for the particular diameter of hose in question. The junior size tool applies bands to hose up to ¾ in. diameter, the senior size for hose 1-in. and over. Bands are made of soft steel wire, electro galvanized and welded.

SQUIRE-COGSWELL CO., 4140 N. Kedzie Ave., Chicago 18.

* * *

Welding Lenses

SEVERAL new designs of welding lenses recently developed by Eastern Equipment Co., include a green type that is said to eliminate glare in aluminum welding. A cobalt blue lens makes smelting and furnace work easier. New non-pit cover lenses are said to be highly spatter resistant. Shatterproof, laminated lenses will protect weldor's eyes from all types of welding and chipping operations. The 50 mm lenses are available with straight edges for cup type goggles and with beveled edges for spectacles.

Gage crystals for oxygen and acetylene regulators are also available.

EASTERN EQUIPMENT CO., Inc., Willow Grove, Pa.

New! Improved Design! Greater Safety!

SAVE WITH SAFETY! ORDER DIRECT FROM

PENOPTIC

809

PLASTIC ALL-PURPOSE COVER GOGGLE

NO. 809
All Clear

The 809 is a general purpose goggle that meets government specifications in providing impact protection from particles striking from any angle and in achieving distortion-free vision. This one-piece goggle formed of non-inflammable, optical plastic affords exceptional wide angle vision, fits comfortably over large frame personal glasses. More than 100 tiny air vents on the top and sides allow constant ventilation. The 809 is lightweight providing new comfort, increased efficiency, preventing wearer fatigue.
Available in the models shown . . . all equipped with easy-to-adjust elastic headbands.

For Prices and Ordering Information Write Direct To

NO. 809G
All Green

NO. 809S
Green Sides
Clear Lens

PENNSYLVANIA OPTICAL COMPANY
READING, PENNSYLVANIA
Known For Fine Ophthalmic Products Since 1866

improved stud welding
through **KSM** engineering

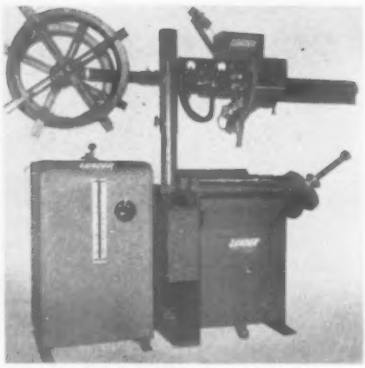
Flux is an important factor in stud welding. Good results start with the right amount at the proper point.

KSM developed solid fluxed studs because a solid mass is controlled to extremely close tolerances. This means the flux is uniform in amount and distribution . . . is precisely and securely centered . . . and its presence can be readily seen by the operator.

Using KSM Arc Welding Studs, you can be sure each has exactly the right amount of flux evenly distributed at the proper point. Welds won't tear out because flux powders shifted.

This concentration of flux at the right point in KSM Studs produces fast, clean, always-perfect stud welding . . . makes the rough jobs easy and cuts costs.

Write for complete information. KSM Products, Inc., Merchantville, N. J.



Improved Welder

FOUR new features boost the usefulness of the Model 550 Leader automatic welding machine. These include a new automatic, self-adjusting high-frequency arc starter and stabilizer which has no moving parts and permits the use of low density current. Especially helpful is the new finger-tip controlled, reversible, variable-speed drive control for the work-handling motor. A new acme-thread powered, horizontal arm lift makes arc positioning quick and easy. New flux handling equipment includes a sight-feed flux hopper and an adjustable two-piece, caster-mounted flux bin which permits it to be used with either turning rolls or positioner.

Other features are a step-over control for positive, manual operation, 4-in. transverse adjustment to provide exact placement of the electrode wire and double reels for handling all types of wire.

LEADER WELDING AND MFG. CO., 2418 Sixth St., Berkeley 2, Calif.

* * *

600 Amp Welder

THE Miller Model SR-600 is said to be the most compact 600-amp d-c welder ever designed, measuring only 27 by 32 by 50 in. Its range is 125 to 750 amp. A selenium-rectifier type, it has such Miller features as "pulsating direct current," magnetic amplifier and a simple remote control. It can be paralleled with other Miller welders for higher currents. It has an open circuit voltage of 70.

MILLER ELECTRIC MFG. CO., Appleton, Wis.

* * *

75-Lb Power Plant

A WEIGHT of 75 lb features the Model 119 Porter-Cable gas-driven generator for powering electric tools. It is rated at 1,500 watts d-c 115 volts at 13 amp. The 4 hp engine has a single cylinder.

PORTER-CABLE MACHINE CO., 18 Exchange St., Syracuse, N. Y.

NOW M & T Completes the Picture

New DC RECTIFIER rounds out M & T Line

Now, with the addition of a new DC rectifier unit, M & T offers as complete a line of arc welders as is available from any one source today. No matter what type of work you are doing or what your requirements may be, there's a well designed, well built M & T unit that will meet your specifications and get the job done for you easily, efficiently and with a minimum of upkeep.

M & T RECTIFIER WELDERS

Rugged, newly designed units for day-in, day-out service on the production line. M & T Rectifiers provide DC welding current with AC welder low operating cost and freedom from maintenance — operate at unusually low temperatures for longer life, more trouble-free service. Available in 200, 300 and 400 amp ratings at 60% duty cycle.

M & T AC WELDERS

Silicone insulation gives M & T AC Transformers high resistance to moisture, chemical fumes and heat — can take temperatures 30% higher than other types of insulation. New range switch provides fast changing from high to low range — no lead to unplug. Case-mounted primary switch saves current between welds. M & T AC Transformers are furnished in light duty 200 amp and heavy duty, industrial 200, 300 and 400 amp ratings.

M & T DC WELDERS

M & T DC Welders — both motor-generator and gas driven sets — are proven by more than 10 years actual field service. They are more efficient, lighter in weight, and more compact. New one-dial control panels provide easy and positive regulation of the welding current. Available in light duty 200 amp, and heavy duty 200, 300 and 400 amp models.

M & T INERT-ARC WELDERS

Completely self-contained design with automatic controls. Series blocking capacitors provide "balanced wave" current. Designed and built throughout for inert-arc welding. Models with and without crater fillers in 200 and 400 amp capacities.

Complete Service to the Welding Field — Companions to M & T's complete machine line are *MUREX ELECTRODES* and *M & T WELDING ACCESSORIES* . . . top quality products which contribute to the M & T reputation as a single source for all arc welding needs.

Complete information available on any M & T product or advisory service on any arc welding problem without obligation — write for it!

METAL & THERMIT CORPORATION

100 East 42 Street • New York 17, N. Y.

MUREX ELECTRODES • ARC WELDERS • ACCESSORIES

DETINNING
THERMIT WELDING
METALS and ALLOYS
ARC WELDING — Materials and Equipment
CHEMICAL and ANODES for Electrotinning
CERAMIC OPACIFIERS
STABILIZERS for Plastics
TIN, ANTIMONY and ZIRCONIUM CHEMICALS

Weld "difficult" steels with little or no pre-heat!

use P&H LOW-HYDROGEN ELECTRODES

P&H has the industry's most complete line of low-hydrogen electrodes — many custom-built to match the chemical analysis or heat-treating properties of a variety of alloy steels. Being hydrogen-free, these electrodes eliminate underbead cracking — little or no pre-heat is needed to get high-strength welds on problem steels, steel castings, nickel-alloy steels, chrome-moly steels, .40 carbon castings, high-hardenable steels, aircraft and similar steels. There are other important advantages, too — for example, lower cost, compared to stainless-steel electrodes formerly used on many jobs. Ask your P&H representative or distributor for all the facts. Or write for bulletin 5-26.

P&H WELDING DIVISION
HARNISCHFEGER CORPORATION
4513 W. National Ave. • Milwaukee 46, Wisconsin

Chrome-moly header, typical of high-pressure, high-temperature applications.

Low-alloy casting, typical of applications where physical properties must be matched.

Alloy gear rim, typical application matching heat-treating properties of parent metal.

Excavator body, typical of heavy sections welded with P&H Low-Hydrogen Electrodes.

the P&H Line

2495

Abrasive-Roll File

A NEW file for metal finishing has a cutting surface that feeds from a coated abrasive roll. Called the "Red Flash" abrasive file, it has an 11-in. stroke and holes a 6-ft roll of abrasive cloth. It comes in 1 and 1½-in. widths and can be filled with "Three-M-Ite" abrasive cloth in grit sizes ranging from 24 to 320. Maker is the Monarch Machine Shop, Inc., Madison, Wis.

MINNESOTA MINING AND MFG. CO., 900 Fauquier St., St. Paul 6, Minn.

* * *

Split Joint Spectacle

NEWEST feature on Watchemoket safety spectacles is the split-joint construction of the lens frames on the Model 80. By removing the temple hinge screw and frame clip, the joint can be expanded to free the lens. New or different shade lenses can be inserted quickly and firmly. The plastic frames come in two sizes to hold 45 by 43 or 42 by 44 mm lenses, prescription or plano.

Other features of the Model 80 are "Retrax" temples that are adjusted by the wearer for a comfortable fit and the "ball-chain" ear hook that fits into the cartilage behind the ear.

WATCHEMOKET OPTICAL CO., 232 W. Exchange St., Dept. N-7, Providence 3, R. I.

* * *

Reversing Foot Switch

NEW switches for close controlling of welding positioners feature simple construction and protection from oil and dust. They are designated as reversing foot-operated toggle switches. The three-pole switch has 12 terminals and will control single-phase, two-phase, three-phase and direct-current motors. Rating is ¾ hp for a-c and ⅛ hp for d-c motors. Action can be either non-spring return (maintined contact) or self-centering (momentary contact). Either action is obtainable by relocating one screw.

ARONSON MACHINE CO., Arcade, N. Y.

Flexible Wheel

FOR light grinding and metal finishing, the "Grind-O-Flex" wheel is said to present a continuous abrasive surface to metal parts. The wheel consists of hundreds of individual abrasive cloth leaves sealed to a hard core. The standard wheel is 6½-in. in diameter, 1-in. wide and is available in a variety of grits.

The "Grind-O-Flex" wheel can be mounted on any standard plain or threaded shaft with the use of a mounting arbor and special flanges. It can be mounted in ¼ or ½-in. chucks. Only the wheel is replaced when it is worn.

MERIT PRODUCTS, INC., 4023 Irving Place, Culver City, Calif.

* * *

Anti-Spatter Compound

TWO new types of anti-spatter compounds for welding fabrication are said to materially reduce clean-up time. "No-Clean" SO-327 provides a firm foundation for paint and requires no removal before priming. "Pickle-Off" SO-317 is recommended for jobs where the weld is to be pickled and for use on chromium or stainless where easy removal is desirable. Both compounds can be brushed, sprayed or wiped along the edges to be welded and surrounding areas. Compounds come in quarts, gallons, 5-gallon containers and drums.

THOMPSON & CO., 1085 Allegheny Ave., Oakmont, Pa.

* * *

One-Man Fire Engine

A NEW dry chemical, wheeled fire extinguisher has been called a "one-man fire engine." Having a capacity of 150 lb of free-flowing, quick-smothering chemical, it may be easily wheeled, maneuvered and operated by one man. Discharge range is 20 to 25 ft. Entire contents can be discharged in about 45 seconds, if necessary. It carries the inspection and approval label of Underwriters' Laboratories, with B and C classification.

AMERICAN-LAFRANCE-FOAMITE CORP., Elmira, N. Y.

P&H

WELDING HEADQUARTERS

—that's where you find cost-cutting answers to welding problems

P&H AC WELDER

Any heat at your fingertips — right at the work — with Dial-lectric Instantaneous Remote Control. Sizes up to 625 amps., NEMA rated. Connectable to 220 and 440 volts.

P&H WELDING TWINS

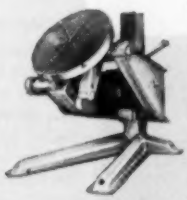
P&H DC RECTIFIER WELDER

Right now —at the work — fingertip Dial-lectric Control gives you the heat you need. Three sizes, 200, 300, and 500 amps., NEMA rated.

P&H WN-301 *Engine-Driven* DC ARC WELDER

It's portable—weld anywhere, anytime. Dial-lectric Control gives you fingertip heat control at the work — for faster, better welding. Runs at only 1750 rpm. Welding service range, 60-375 amps., NEMA rated.

P&H POSITIONERS



One finger is enough to position heavy weldments for economical downhand welding. Capacities from 2500 to 36,000 lbs. — remote-control and hand-operated models.

Ask your P&H representative or distributor for complete information, or write for free bulletins.

P&H WELDING DIVISION

HARNISCHFEGER CORPORATION

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Illustrated is the No. 335 Welder's Coverspec Goggles. A wide range of other types are available at savings.

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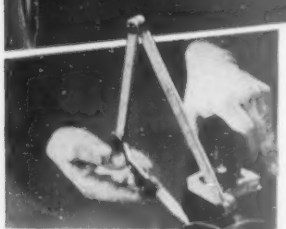
DIVISION OF THE BURDETT OXYGEN COMPANY, Cleveland, Ohio

LAY OUT PIPE JOINTS *in minutes!*



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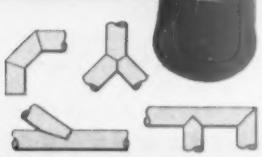
A SMOOTH SWING of the Contour Marker's soapstone point and you're ready to cut! It's easy and *absolutely accurate* because there is an angle dial calibrated in both degrees and pitch. Any of the pipe joint angles shown can be marked off in minutes. And you save "man hours" as well as oxygen and acetylene gas because "cut and try" methods are completely eliminated. Two sizes are available complete with adapter for marking structural steel. Standard, for pipes from 1½" to 18" dia.; Jumbo, for pipes from 16" to 48" dia. Instruction book included. Belt case available. Write for information.



CONTOUR MARKER CORPORATION OF CALIFORNIA

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THE CONTOUR MARKER

Mig and Tig Welding

Dear Sir:

My attention has been called to your editorial in THE WELDING ENGINEER about welding terminology and inert-gas metal-arc welding in particular. Because similar comments have been made by others, I would like to clarify the position of AWS in the matter of welding terms and their definitions.

Your editorial begins by suggesting that something ought to be done "about the gobbledegook that is cluttering up our own industry;" this is the very function of the AWS Committee on Definitions, which has been working on standardizing terminology for a long, long time.

There is no reason why anyone should not use "Mig" and "Tig" or similar terms or even "X" and "Y" to label a welding process, provided he is sure that those whom he is addressing knows what he is referring to. To me, however, the use of such terms is in the category of the vernacular. We use "ain't" quite often in everyday talk, although they used to say "ain't ain't in the dictionary."

When it comes to standardizing on terminology and definitions, a more precise and more technical (perhaps even scientific) approach is necessary.

While, in fact, lawyers did not have a part in the formulation of AWS definitions, legal aspects were carefully considered. Remember AWS terminology is incorporated in its own codes and specifications and in the regulatory requirements of code-writing bodies all over the United States. The precise meaning of a term, in its full technical sense, can very often be the difference between getting what you want and getting something else; this is especially true where distance is involved, as where the design is done in one city and the fabrication in another city at the opposite end of the country. Only recently, there was a law suit involving several million dollars which hinged on the question of what is brazing and how does it differ from braze welding. (See AWS "Standard Welding Terms and Their Definitions.")

Even apart from the legal aspects,

LETTERS . . . . . *Continued*

standard, precise terminology is desirable from the standpoint of conveying meaning. Consider the man, in proverbial Podunk, who is unfamiliar with welding and is looking for information. The complete technical term is descriptive; a contraction or name formed from abbreviations cannot be.

In writing the AWS Standard Terminology, we followed the principle of making definitions as inclusive as necessary to convey accurate meaning and at the same time as exclusive as necessary not to cover what was not applicable.

The terminology and definitions of the welding processes start with the Master Chart of Welding Processes. On this chart, the 37 welding processes in common use in industry are divided into eight groups of processes, according to recognized industrial practices.

The definition for each process is the same up to a point (they are after all, all *welding* processes) and then continues with the basic differences of each. Thus you will see that the difference between the shielded metal-arc welding processes is the method of shielding: electrode covering, granular flux, impregnated tape, inert gas, etc.

At the time the current AWS definitions were written, there was only one kind of inert-gas metal-arc welding. The consumable electrode method was yet to come.

Our committee spent a lot of time and thought in working up the term "inert-gas metal-arc welding." As you point out in your editorial, it is the gas that is inert, not the arc, so "inert-gas" rather "inert-arc" had to be used to avoid this confusion.

Furthermore, it was felt that if the term "inert-gas welding" were used, the process could erroneously be taken to be a gas welding process, which of course it is not. It was necessary to use "metal-arc" in the term because carbon arcs are sometimes used, for which the term "inert-gas carbon-arc welding" is provided.

As of now we have no official standard terminology to distinguish the consumable and non-consumable electrode methods. For the present, we are using "inert-gas metal-arc (consumable electrode) welding" and "inert-gas metal-arc (non-consumable electrode) welding." Calling the non-consumable electrode method "tungsten arc" is all right; however, calling the consumable electrode method "metal arc" ignores the fact that tungsten is a metal so that "metal arc" does not exclude tungsten, as it should in accordance with the

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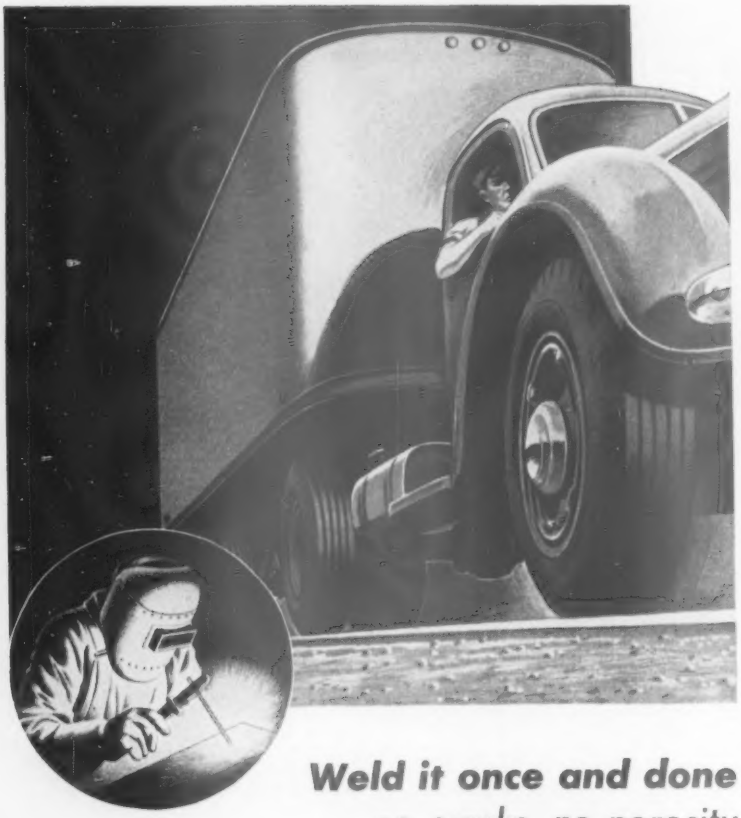
PAGE Welding Electrodes AND Rods



Weld it once and done
no cracks, no porosity

Lightweight, tough, high tensile steels have made it possible for truckers to haul heavier loads with less dead weight—a decided economy.

No less important in saving time and money is the use of low hydrogen electrodes to weld these steels. When you weld low alloy high tensile steels—whether your requirements are tough or easy—Arcos Low Hydrogen Electrodes will consistently produce sound welds . . . welds that are free of cracks or porosity. There is no reworking of such welds—no chipping or re-welding to add more time to the job. The ability of Arcos weld metal to stand up in tough service—such as the strain on truck bodies of heavy loads or the impact of sudden stops and starts—is the result of high standard quality controls in the manufacture of Arcos electrodes.

Send for the free Arcos booklet, "The ABC's of Welding High Tensile Steels". Arcos Corp., 1500 South 50th Street, Philadelphia 43, Penna.

ARCOS GRADE	A. W. S. SPEC.
Tensilend 70	E7016
Tensilend 100	E10016
Tensilend 129	E12015
Manganend 1M	E9015
Manganend 2M	E10015
Nickend 2	E8015
Chromend 1M	E8015
Chromend 2M	E9015

WELD WITH ARCOS
LOW HYDROGEN ELECTRODES

LETTERS . . . . . *Continued*

principle stated earlier.

No one can argue that either of the complete terms is not a big mouthful or a long slug of type. As a practical matter I have suggested that the full, precise term be used the first time it is mentioned in a talk or paper. Any contracted term can be used for all subsequent references provided it is made clear the first time which method is intended.

I want to make it clear that I have written you not to take issue with your editorial but to take the opportunity it affords to point out how important it is to say what you mean so the other fellow understands you and to point out how AWS is trying to provide the means for doing this and replace gobbledegook by sound technical terms befitting an engineering science.

Simon A. Greenberg,
Technical Secretary,
American Welding Society.

Welded Ships

Dear Sir:

I just received my May copy of THE WELDING ENGINEER and I cannot refrain from expressing my opinion on the article, "Why Some Welded Ships Fail."

I do not agree with the statement, "The culprit isn't welding." The culprit is welding without stress control, thus leaving yield-point tension at a vital point. That yield-point tension stress plus stress would always cause failure were it not for the fact that steel and welding are so good and reliable they will hold if given only half a chance. (They do not always get that half chance.)

The same is true of nearly all welded structures as they are welded today and definitely is the cause of 90% of all welding failures.

A poor weld with the stresses controlled is better than a good weld with the stresses wrong.

I defy anyone to show me a failure, in a ship or other weldment, where the residual stresses caused from welding were not with the load.

Yes, I know the Committee reported "residual stresses have no bearing on ship failures." I say they must dig deeper next time.

It is during the fabricating operation that these stresses must be controlled and assist in the load-carrying capacity of the weldment or ship. If ship plates are overloaded by improperly placed stresses, caused from our present day procedures, it matters not how good the design, a failure is certainly invited to occur.

All designers should take into con-

LETTERS . . . . . *Continued*

sideration this residual stress problem and specify stress control during the welding operation.

If a specimen is notched and loaded, the same results occur as in a ship failure. If another specimen from the same bar is notched, and the base of that notch is put under compression by the proper use of the torch or arc welder and then loaded, the results are much different. The bottom of that notch has to change from compression to neutral to tension before a dangerous condition can exist. (All fatigue failures occur in tension areas.)

I am afraid we are prone to confuse brittle failure with a tear or edge effect. Try to pull a piece of paper on the edge (yes, or thin steel). Now try to pull it through the center line. Rather crude example but right.

If there must be notches in our present ship hulls, the metal at those points must be under compression normally. This can be accomplished by proper welding procedures. Proper procedures will not only control stresses at the point of notch but will also control distortion so that all the steel in a ship will properly carry its load rather than increase or decrease in deformity. The same principles apply to welded buildings and bridges; to all weldments, in fact.

Oh, that the welding world would wake up to the most valuable use of stresses created by welding and use them rather than fight them!

Joseph Holt,
Seattle, Wash.

Electrode Charts

Dear Sirs:

We have been subscribers to your magazine for some years now and have enjoyed every copy.

We are looking for a comprehensive comparison sheet of welding electrodes, and wonder if you could help us out.

Ross W. Common
Welding Rod Division
The Steel Co. of Canada, Ltd.
Montreal

(We sent him Data Sheet No. 145 on stainless steel and No. 122 on mild steel electrodes.)

That Selling Forecast

T. B. Jefferson
The Welding Engineer
520 N. Michigan
Chicago

Dear Sir:

Your editorial May issue terrific. May we reprint for internal distribution?

W. Goerg, Jr.
Air Reduction Sales Co.
New York City

When you want
to ***lick corrosion***
for longer equipment life

Getting good corrosion resistance starts with a base metal of desirable characteristics. However, maximum equipment life can be assured only when the welds possess the same corrosion resistance as the base metal.

ARCOS STAINLESS ELECTRODES are designed to deliver the results you need on *all* your welding jobs. Regardless of the requirements, there's a wide selection to provide the best suited electrode for every application. Because each is backed by Arcos quality controls, you have complete assurance of physically, chemically, and metallurgically sound weld metal. That means longer-lasting welds . . . less time and fewer dollars for maintenance. Write for your free copy of "What Electrode Would You Use?"

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For Welding and Cutting . . .

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New!

K-G 1100

Series (Two Stage) Regulators

Illustrated: Model 1101 Two Stage Oxygen Regulator

- Working pressure remains constant
- Anodized forged aluminum bodies and bonnets
- 4000 lb. HP gauges
- Smooth flow, large capacity

Designed for today's higher cylinder pressures. Light, compact — accurate pressure control. Simple, rugged—few parts, all readily accessible. *Also new:* K-G 1200 Series Single Stage Regulators. See your K-G Distributor or write to

The K-G Equipment Company (Inc.)

A Unit of Air Products, Inc.

Dept. A, Box 538, Allentown, Pa.

LETTERS . . . . . *Continued*

The Norton Story

Dear Sir:

My only comment on your review:

When a gentleman is so extremely nice to me, how could I possibly have any criticism or further suggestion? He pays me the supreme compliment: "She is not a technician but a writer." I shall never be casual about this label. It always comes as a shock. I write, but don't presume to call myself a "writer."

And his comment that I was forced "to start from scratch," when you realize that it's the abrasive business, is a positive stroke of genius!

The sequence of historical facts might not be exactly as I would outline it—but such is the prerogative of reviewers to choose what they will. And I would say—let's be very grateful to this one.

M. Tymeson

30 YEARS AGO

(Taken From THE WELDING ENGINEER *of* July, 1923)

SOME 11 hours and 20 minutes were recently saved on the chamfering of a break on a 2,800 lb cast iron punch press frame. With a cutting torch, the job took only 40 minutes, compared to 12 hours for an air chisel, states the ad for Oxweld Acetylene Co.

—30 YEARS AGO—

NICKEL-iron electrodes are being successfully used to weld cast iron on the M. K. & T. railroad at Shreveport, La., reports a weldor in the shops there.

—30 YEARS AGO—

THE tool box supplied by the Metal and Thermit Corp., New York, for use in Thermit rail welding has recently been equipped with a platform for ramming two-part molds which are applied to the rails before welding. Another Thermit news item comes from Europe where it is reported that certain soldering irons in use there are heated by a Thermit-like reaction. The body of the iron has an enclosure equipped to take a Thermit briquette. Ignited with a match, the charge heats the iron to about 650 F so that it stays at soldering heat about 10 minutes. A domestic pressing iron is also made on the Continent in which the same principle is used. It is said to stay hot for 20 minutes.

—30 YEARS AGO—

I'd rather have an inch of dog than miles of pedigree. —*Dana Burnet*

WORTH WAITING FOR!

WELD-ARC LOW HYDROGEN ELECTRODES

For Welding with AC-DC in All Positions

WELD-ARC TYPES	TYPICAL WELD DEPOSIT ANALYSIS
7016	.70% Mn
7016 N	1.0% Ni
8016 N	3.30% Ni
9016 CM	1.0% Cr—.50% Mo
9016 MM	1.70% Mn—.40% Mo
9016 NCM	1.35% Ni—.55% Cr—1.40% Mn
10016 NM	1.70% Ni—1.35% Mn
10016 CM	2.40% Cr—.50% Mo
12016 NMV	1.75% Ni—1.25% Mn—.25% V

A FULL AND COMPLETE LINE OF NINE DIFFERENT LOW HYDROGEN ELECTRODES

HERMETICALLY SEALED in 10 lb. moisture-, dirt-, grease- and dust-proof all-metal containers immediately upon emerging from the baking oven.

SECURELY PACKED in oven-fresh condition, with 6 containers carefully cushioned from each other by inner carton; then placed in a sturdy outer carton to prevent possibility of any damage en route to you.

Send for your free copy of

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YORK, PENNSYLVANIA

NO FINER ELECTRODES MADE... ANYWHERE

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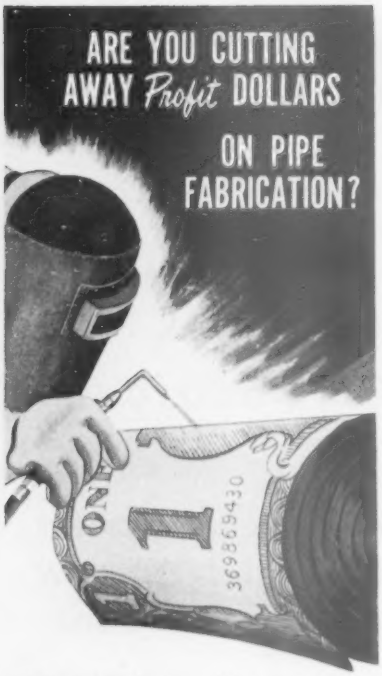


If tedious hand-cutting and fitting is chewing up the profits in your pipe fabrication jobs, put a stop to it right now! Your time can be accurately estimated and more profit dollars assured by letting the H & M Shape-Cutter whip out your most difficult contour cutting problems in a matter of minutes. With the H & M here's all you do: Quickly attach the right pattern to your H & M Cutter and Beveler; lift the split horseshoe-shaped gear over the pipe; snap the spring-tension chain

fastener which locks the H & M securely in place; light the torch, adjust the flame and give the crank a few turns — THAT'S ALL, the job is done and you have a perfect, accurate cut, less reject welds assured. For more detailed information —

WRITE FOR THE FREE FOLDER
"MORE PROFIT DOLLARS IN PIPE FABRICATION"

H&M PIPE BEVELING MACHINE CO.

Trade Mark Reg. U.S. Pat. Off.

311 E. 3rd. St. • Ph. 3-0241 • Tulsa, Ok.

Westinghouse Air Brake Buys LeTourneau Earth-Movers

WESTINGHOUSE Air Brake Co. has taken over the earth-moving and related business of R. G. LeTourneau, Inc., including all fixed assets and machinery at Peoria, Ill., Toccoa, Ga., and its interest in the Australian subsidiary, for about $19,500,000.

With the new purchase, Westinghouse Air Brake becomes the owner of about 199 acres of land and 720,000 sq ft of floor space in Peoria, 174 acres of land and 414,000 sq ft of floor space in Georgia and the 1,483 acres of land and 83 houses of the LeTourneau housing development at Toccoa.

The new business will be operated as the LeTourneau-Westinghouse Co., a subsidiary of Westinghouse Air Brake. No change in personnel is contemplated.

The Vicksburg, Miss., and the Longview, Tex., plants will remain with R. G. LeTourneau, Inc., which will continue to operate them and manufacture special products for the U. S. Government, land clearing equipment, cranes and other products not related to earth-moving.

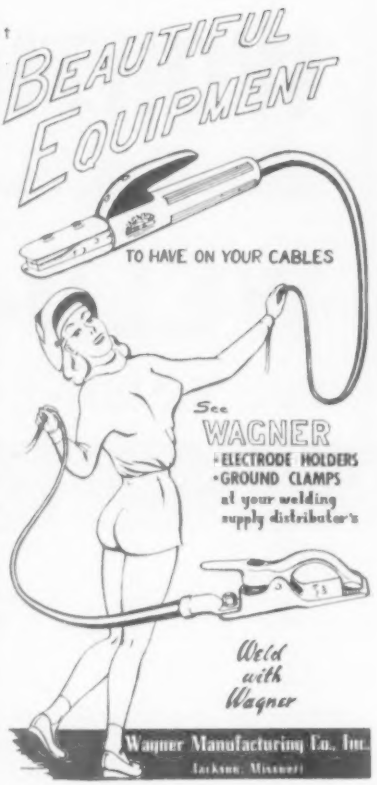
Officers of the new LeTourneau-Westinghouse Co. are Merle R. Yontz, president; Elmer Isgren, executive vice-president; Herbert A. May, vice-president, John Schoen, vice-president and general sales manager and Warren Wemple, vice-president and controller. Mr. Isgren is nationally recognized as a pioneer and leader in the use of welding for earth-moving machinery.

* * *

Canadian Company Formed By Eutectic Welding

INCREASED Canadian demand for Eutectic welding alloys has made necessary formation of a Canadian subsidiary, according to Rene D. Wasserman, president of Eutectic Welding Alloys Corp., Flushing, N. Y. Name of the new company will be The Eutectic Welding Alloys Co, of Canada, Ltd. L. D. Richardson will act as general Canadian sales supervisor. Michael Doody will supervise the organization in Ontario, Quebec and the Maritime provinces.

Eutectic district engineers have been appointed for various industrial centers. The representative in Nova Scotia will be Harbour Motors, Ltd., 161 Portland St., Dartmouth, N. S.; in Regina, Saskatchewan, Antonini Service and Supply Co., Ltd., 1542-44 Albert St.; in Edmonton, Alberta, John H. Ross & Co., Ltd., 6803 104th St. and in Vancouver, British Columbia, by Malkin & Pinton Industrial Supplies Ltd., 2030 W. Broadway.



. . . AT THESE UNUSUAL ONE WEEK COURSES

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Unique group-conference technique is combined with practical applications in this widely praised one-week course. Write for full course outline and details—no obligation, of course.

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Firm_____
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City_____ State_____

Newest Welding Methods Make Aussie Cars

ADVANCED welding techniques and equipment are in use at Messrs. Repco Ltd., Melbourne, turning out parts for the Australian-designed Holden auto. This car is entirely made in Australia by General Motors-Holden Ltd., a subsidiary of General Motors Corp. The country's best seller, some 25,000 Holdens are produced every year.

A submerged-arc installation has increased the production rate of joining universal yokes to tailshafts by sevenfold over manual methods. The special machine made up for this job consists of a horizontal hydraulic press, a rotating fixture and two electronically controlled welding heads. After the press fits the yokes into the tubes, the assembly is placed in the rotating fixture and raised to welding position.

Automatic submerged-arc welding is used at the Adelaide plant to make the differential housings for the Holden. The housing is all-welded and consists of two steel pressings welded longitudinally to form the shell. The banjo cover, differential reinforcing ring and wheel bearing housings are welded to the shell.

The photo above shows a special fixture for welding the reinforcement ring and banjo cover. The "3 o'clock" welding process, developed by Lincoln Electric Co., is used to weld both sides simultaneously.

The two welding heads are supported at an angle of 30 deg to the horizontal with the electrode wire directed principally on the vertical part of the lap joint. Flux is fed to the joint through flux tubes attached to an overhead hopper and it is dammed by a copper ring which forms part of the jig. The weld is made in only 22 seconds.

—McGraw-Hill World News

Braze welding cast iron, water-cooled mold.

Stronger repairs made faster and cheaper with

Bridgeport No. 192 Low Fuming Bronze Rod

Repeated expansion and contraction resulting from casting molten brass had caused the development of cracks in a huge cast iron, water-cooled mold. To replace this mold involved a cost of hundreds of dollars in labor and materials besides expensive production loss because of shutdown time. By cutting out the weakened portion of the mold and replacing it with a strong bond of Bridgeport's No. 192 Low Fuming Bronze, this equipment was returned into production in a matter of hours.

Making repairs with braze-welding completely eliminates the need for over-all preheating and slow cooling. Local preheating is all that is required —sometimes without even dismantling the broken equipment.

Repair of broken parts and building up of worn surfaces are not the only applications for Bridgeport's Welding Rod. Silicon Bronze Rod is used extensively for the fabrication of light gauge steel parts.

You will find the complete story in our booklet, "Bronze Welding Alloys." May we send you a copy?

Bridgeport BRASS CO.

BRIDGEPORT BRASS COMPANY
Bridgeport 2, Conn. Established 1865
Mills at Bridgeport, Conn., and Indianapolis, Ind.
In Canada: Noranda Copper and Brass Limited, Montreal

Bronze Welding Rod A PRODUCT OF **BRIDGEPORT BRASS**

There's a RANITE Rod for every Hardsurfacing Application

Ranite welding rods are easy to apply, yield more deposit, give longer wearing surfaces.

Type	Tip Color	Rockwell C Hardness
A	Blue	25-30
B	Yellow	44-50
BX	Gray	44-50
C	Red	60-62
D	Green	63-68
F	Purple	53-57

Ranite #4 High alloy cast hardness 56-60. Rantung: Composite Tungsten carbide in tube.

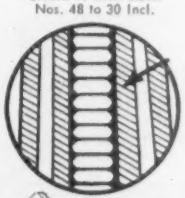
RANKIN MANUFACTURING CO.
3072 West Pico Blvd., Los Angeles 6, California

60 more workers

WYPO
WIpes and POlishes
CUTTING and WELDING
TIP CLEANERS

STANDARD SET OF 12
Cleans 27 Drill Sizes.
Nos. 75 to 49 Incl.

JUMBO SET OF 9
Cleans 19 Drill Sizes.
Nos. 48 to 30 Incl.



U.S. Patent No. 2,429,581
In Canada 1948

The exclusive circle design found only in Wypo Cutting and Welding Tip Cleaners provides as many as 60 more cleaning edges per inch of cleaner. Straight sided valleys, another outstanding feature of Wipo Tip Cleaners, insures a thorough cleaning and removal of all waste.

DOUBLE THE LIFE OF YOUR WELDING AND CUTTING TIPS

Fast, easy cleaning without jamming, scratching or enlarging the tip port means added years of service to your welding and cutting tips. Only with Wypo Tip Cleaners do you get thorough cleaning and polishing with one quick and easy motion.

WYPO TIP CLEANERS ARE AVAILABLE AT ALL WELDING SUPPLY JOBBERS

Recommended and sold by the world's largest manufacturers of welding equipment

MAITLEN AND BENSON INC.
1395 Obispo St., Long Beach 4, Calif.

Buy Wypo Tip Cleaners at your welding supply dealers today

Air Products Completes $200,000 Expansion

A BIG expansion and rearrangement program for increased production efficiency is nearing completion in the Emmaus and Allentown, Pa., plants of Air Products, Inc. The company manufactures oxygen-nitrogen generators and equipment employing very low temperatures used in the steel, glass, chemical and petroleum industries.

The test department has been moved to a new location in the Emmaus plant. From now on all large generators will be assembled, tested, painted and shipped from there. A T-shaped pit, 20 ft deep, 16 ft wide and 52 ft long has been constructed for testing and experimental work. A new siding will connect the department with the Reading Railroad, giving the company two railroad connections.

Construction is also under way on the first unit of six in a new Air Products laboratory.

* * *

Power Questions in Welding Talked at AIEE Meeting

ONE of 54 sessions on various aspects of electrical engineering discussed at the June 16 meeting of the American Institute of Electrical Engineers was "Utility Charges for Service to Resistance Welders." The 5-day meeting was sponsored by the Philadelphia section of AIEE and was held at the Chalfonte-Haddon Hall Hotel in Atlantic City, N. J.

Welding papers included the following subjects and speakers: Fundamentals of Electric Rate Making, L. R. Lefferson, Ebasco Services, Inc.; Utility Metering on Resistance Welding Loads, M. A. Faucett, University of Illinois; Why Special Utility Charges for Resistance Welders? by R. S. Phair, The Budd Co. and Design of Transformers for Resistance Welding Machines, by D. L. Knight, National Electric Welding Machines Co.

* * *

Lithium Shortage Reported by Aluminum Brazers

IN June there were indications of a shortage of lithium, which is widely used in aluminum brazing fluxes. Normal demand for flux is only a few million pounds per year, but recently other applications have become more prominent.

Production has been increased by new refining facilities and the additional capacity created should bring the supply in balance by the third quarter of this year.

Student Asks 9 Jail Months To Finish Welding Course

THE welding trade offers some enticement to a young Canadian, who recently asked for an additional 9 months on his jail sentence to finish a welding course given there. According to an Associated Press story from Winnipeg, the 29 year-old man wanted the extra time on his 15-month sentence in Stony Mountain Penitentiary to complete his welding training. Word from The Lincoln Electric Co. says the magistrate on the case agreed to the prisoner's request for the extra time behind bars.

* * *

National Cylinder-Girdler Merger Given Approval

STOCKHOLDERS of National Cylinder Gas Co. at a May 28 meeting gave approval for merger with The Girdler Corp., Louisville, Ky., with National Cylinder as the surviving corporation. Girdler will continue as The Girdler Co., a division of NCG. Tube Turns, Inc., Louisville, up to recently jointly owned by NCG and Girdler, will be operated as a wholly-owned subsidiary. Effective merger date was June 1.

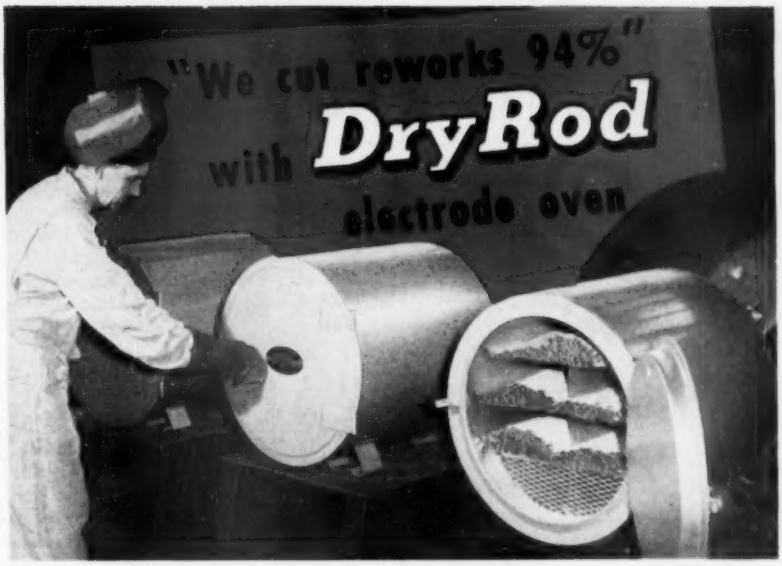
* * *

Arc Strikes May Cause Fractures in Weld Area

ARMY Ordnance has definite evidence that arc strike has been instrumental in creating fractures in weld areas on hardenable steels. Ordnance also says that the thickness of the stock has some bearing on failures especially if it is less than 1-in.

In the good old days weldors worked and fabricated mainly with mild steels. Today, fabricators are not only working with hardenable steels but with steels in the hardened condition.

"YOU SAID I SHOULD USE WHATEVER ROD I PREFER."



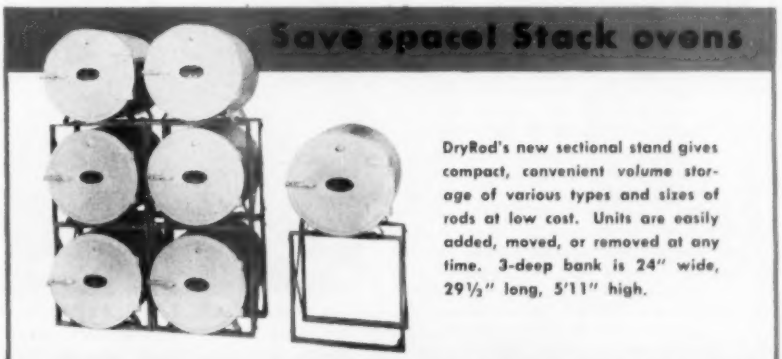
When rejects reached 1 in 3 on a welded hydraulic fitting, engineers of a leading Milwaukee machinery plant* diagnosed the trouble as moist electrodes. They installed a low-cost DryRod Electrode Oven . . . stored all unpackaged low-hydrogen rods in it. Welders noticed *immediate* improvement . . . got faster, better welds, with few rejects. As the welding engineer put it, *"DryRod successfully solved our welding porosity problem. With it we've been able to cut our reworks from 30 pieces to less than 2 pieces per hundred. That's a 94% reduction."*

*Name on request.

Get your money's worth

You pay a premium for stainless steel, low-hydrogen or other mineral-coated electrodes. Preserve that "baked-in" quality with DryRod Electrode Oven. Three 350-lb. capacity ovens occupy only 5 sq. ft. floor space with new DryRod stand. 175° to 550° range, 110/220 or 220/440 volt AC. See your welding supply dealer, or write direct for free folder.

DryRod—Trademark X-DR-9



DryRod's new sectional stand gives compact, convenient volume storage of various types and sizes of rods at low cost. Units are easily added, moved, or removed at any time. 3-deep bank is 24" wide, 29½" long, 5'11" high.

DryRod
Electrode Oven
DIVISION OF
Phoenix Products Company
MILWAUKEE 16, WISCONSIN

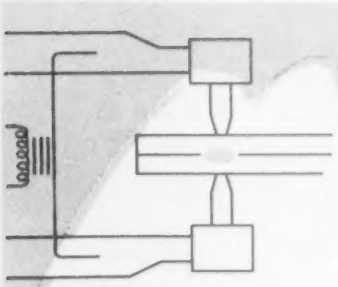
WRITE FOR FULL INFORMATION

Phoenix Products Company X-DR-9
4715 N. 27th St., Milwaukee 16, Wis.

☐ Send bulletin DR-752 showing how DryRod can save me money on high-strength welds.

☐ Send chart giving recommended temperatures for various mineral-coated electrodes.

Name .....
Company .....
Address .....
City ..... State .....



Here's a Money-Saving TIP

. . . for cleaner, sounder welds—less downtime—increased production

Use AMPCO WELD* Spot-welding Tips

Get tough with your spot-welding costs. Reduce downtime, get longer runs — use Ampco Weld spot-welding tips. These electrodes have unusual resistance to mushrooming and wear. They have high electrical conductivity, too — they stay cooler, don't stick to the work.

That's why Ampco Weld resistance-welding tips require far fewer dressings, stay on the job longer, save you money because of fewer shutdowns.

Ampco-weld tips are part of an extensive line of Ampco resistance-welding products. All meet, and most exceed, RWMA specifications. And free, expert Ampco engineering service is available if you want or need it. Order Ampco tips today — and step up your production for lower costs.

Write for latest catalog.

*Reg. U. S. Pat. Off.

RW-6

AMPCO

Ampco Metal, Inc.
Dept. WE-7
Milwaukee 46, Wisconsin

West Coast Plant • Burbank, California

Alloy Rods Adds Seven To Distributor List

NEWEST additions to the distributor roster of the Alloy Rods Co., York, Pa., are the following seven firms: Massey Auto Parts, Brownwood, Tex.; Heidt Equipment Co., Oakland, Calif.; Rene Neven & Son, Plattsburg, N. Y.; Welders Supply Co., Portland, Ore.; Lone Star Welding Supply, San Antonio, Tex.; General Engineering & Machine Co., Tampa, Fla.; Dunlap Welding & Supply Co., Zanesville, O.

* * *

260 Ft Long Building Added to American Welding

AN 18,200 sq ft addition to the present plant of the American Welding & Mfg. Co., Warren, O., will be built by The Luria Engineering Co., Bethlehem, Pa. It will be a standardized steel-frame structure 260 ft long with a clear span of 70 ft. The building will be 16 ft high to the eaves and will have masonry walls, a metal roof deck and built-up roofing. The Diamond Steel Construction Co., Youngstown, O., will put up the building.

* * *

No-Mast Liner Launched

RECENT launchings in Britain included that of the all-welded hull of the 28,000 ton, $14,000,000 *Orsova*, first of the big ships to have no masts. The new vessel is intended for the Britain-Australia run.

* * *

GARGANTUAN PIPE FITTING weighing 86 tons will go into penstocks at Chief Joseph Dam on the Columbia River near Bridgeport, Wash. Made of 1-in. thick steel it is one of 32 elbows being fabricated by Consolidated Western Steel's South San Francisco plant. The elbow is 25 ft in diameter and 58 ft long and was assembled at this U. S. Steel division before shipping, to check measurements. At this same plant weldors are fabricating more than 2,500 tons of straight pipe sections for the penstocks, which will channel river water 238 ft down to generating turbines in the power house.

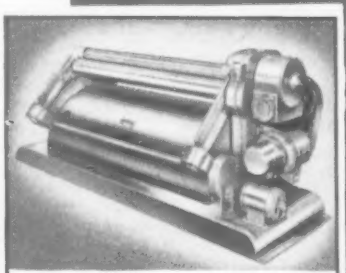
REED ENGINEERING CO.

Modern Metalworking Equipment

- BENDING ROLLS
- TURNING ROLLS
- AUTOMATIC WELDING FIXTURES

REED WELDING POSITIONER

- ★ Machined face with cast-in "T" slots
- ★ Machine Tool accuracy
- ★ 10-to-1 speed variation
- ★ Ball bearing work table mounting
- ★ 1000, 2500 lb. models, hand or power tilting
- ★ Rotating ground connection



REED PLATE BENDING ROLLS

- ★ In 16 models, ranging from 3 ft. x 10 ga. to 8 ft. x ¼" in capacity
- ★ Rugged, all steel construction
- ★ Built-in, silent worm gear drive
- ★ Durable, special bronze bearings
- ★ Power adjustment & air drop end available on most models

WE INVITE YOU . . .
to write us for specifications, prices, list of REED users near you. No obligation. Just write on your letterhead.

REED ENGINEERING CO.
1007 W. FAIRVIEW, CARTHAGE, MISSOURI

CHANGE Resistance Welding Die Set-ups ... In a Matter of Seconds

Mallory "Nu-Twist*" Die Adaptors provide complete flexibility in welding operations with one die set-up

Now, you can switch from one job to another without changing dies . . . and you can do the entire job in a matter of seconds. Mallory "Nu-Twist" Die Adaptors are designed so that all the operator has to do is turn the locking nut by hand, slide out the electrode insert, slip in the one for the next job and turn the locking nut. It is simple as that . . . requires no tools.

Shops having small run resistance welding applications such as projection welding, single spot welding and electrical upsetting can effect substantial savings in set-up time and reduce die inventory. Die adaptor bases are custom designed to fit your machine specifications. Standard electrodes are available from stock. Special shapes can be designed to fit most requirements.

For complete information either write us or ask your Mallory Distributor for a copy of Technical Bulletin 8-28.

Expect more
Get more
from MALLORY

Electrode inserts give more flexibility... less down time.

Typical electrode for projection welding using an insulated locating pin.

Electrode insert for spot and mash welding, electrical upsetting or single projection welding.

Electrode insert for typical projection welding operation.

In Canada, made and sold by Johnson Matthey and Mallory Ltd., 110 Industry Street, Toronto 15, Ontario

RESISTANCE WELDING ELECTRODES, HOLDERS, DIES, RODS AND BARS, CASTINGS, FORGINGS

*Trade Mark, Patent Applied For

P.R. MALLORY & CO. Inc.
MALLORY

SERVING INDUSTRY WITH THESE PRODUCTS:
Electromechanical — Resistors • Switches • Television Tuners • Vibrators
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Metallurgical — Contacts • Special Metals and Ceramics • Welding Materials

P. R. MALLORY & CO. INC., INDIANAPOLIS 6, INDIANA

For information on titanium developments, contact Mallory-Sharon Titanium Corp., Niles, Ohio

Cut Your Gas Bill Up To ONE-HALF!

PILOT-LIGHT FLAME

- Saves gas . . . saves time
- Full "pre-set" heat instantly
- No re-adjustment
- No re-lighting

MARQUETTE
REG. IN U. S. PAT. OFFICE

MODEL H

INSTANT HEAT AUTOMATIC Welding Torch

With Marquette's new "Instant Heat" automatic torch, you light once, adjust once . . . and let the pilot light burn between welds. Press the lever . . . you get full flame instantly. Release it, and it cuts automatically to a tiny pilot flame, saving up to one-half on gas. Marquette's Instant Heat Automatic Torch is a precision-made instrument, embodying such features as "O"-Ring seals, full tip swivel, stainless steel heat barrier. Write for complete information.

MARQUETTE
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Welding & Automotive Service Equipment

MARQUETTE MANUFACTURING CO., INC.
307 E. Hennepin Avenue • Minneapolis 14, Minnesota

Electrodes Turned Out at 50,000,000 lb Monthly

PRODUCTION figures since the first of the year indicate a high level of sales and manufacture of welding equipment, though a little off from late 1952. Some 58,000,000 lb of welding electrodes were produced during the month of December, 1952. Electrode manufacture tapered off during the February to 49,000,000 lb but was back up to 52,000,000 lb by March again.

Machine production is also holding up very well. One large manufacturer reports that March and April sales and production figures were the highest in the company's history.

* * *

Eutectic Color Film Shows Welding Advantages

A NEW colored strip film with sound accompaniment has been produced by Eutectic Welding Alloys Corp., 172nd and Northern Blvd., Flushing 58, N. Y. It features actual case histories of savings in production, maintenance and salvage welding operations. It has many detailed diagrams and cartoons to explain technical matter. Information on the film and how to borrow it is available from the company.

* * *

Phoenix Warehouse Established by De-Sta-Co.

NORMAN S. Wright & Co., west coast representative and distributor of "De-Sta-Co" toggle clamps, has established an office with warehouse facilities at 112 West Jackson St., Phoenix, Arizona. The new facilities, under the direction of Robert Langmade, will enable the Wright Company to provide better service to expanding southwestern industrial activities.

* * *

160 Students Attend British Welding School

THE School of Welding organized by the British Welding Research Association was held from April 27 to May 2 at Ashorne Hill, near Leamington Spa and was attended by 160 students. Divided into five groups, the students each attended 19 lectures during the week. Films, demonstrations and exhibitions were also on the program. Welded products shown included a motor-car chassis, an aircraft petrol tank, jet engine, an aluminum bed plate, a bridge panel and a base for a mobile crane.

—McGraw-Hill World News

WELDERS' CLAMPS

Each Tool Is Individually Power - Tested

Ask for CATALOG showing the most complete line of CLAMPS. Stock sizes from ¾" to 12' opening ½" to 16" deep.

THE CINCINNATI TOOL CO.
1944 Waverly Ave., Cincinnati 12, Ohio

THERE IS AN INDUSTRIAL DISTRIBUTOR STOCK NEAR YOU

JOHNSON'S *NEW* *All-Purpose* BRAZING FLUX

JUST HAS SOMETHING NO OTHER FLUX HAS

YES experienced welders have found that this new all-purpose brazing flux really travels . . . really cleans metals . . . and DOESN'T BURN OUT!

TRY JOHNSON'S NEW FLUX on the toughest job in your shop . . . you'll be convinced that this flux beats any other flux you've ever used!!!

FREE SAMPLES
Sent upon Request

JOHNSON
MANUFACTURING CO., INC.
601 First Ave.
Mount Vernon, Iowa

Canadian Welding Society Elects New Officers

ALLAN Clarke, superintendent of the Ontario Paper Co., Thorold, Ont., was recently elected president of the Canadian Welding Society for 1953-54. Vice-presidents will be E. A. Gill, Toronto, and S. P. Lockhart, Hamilton. Treasurer will be A. V. Philips, Toronto.

Chairmen of committees appointed for 1953-54 are A. S. Tuttle, The International Nickel Co., university societies; J. M. Gulley, George Rumble Co., publicity; C. J. Jacques, by-laws; R. A. Dunn, International Institute of welding; J. F. Royer, Canadian Standards Association and E. A. Gill, Ryerson Institute. W. T. Cherry was appointed executive secretary of CWS for 1953-54.

* * *

Weldwire Marks 3 Years of Development

JUNE marked the third business year for The Weldwire Co., Inc., Philadelphia. During these years, the company has pioneered in chemically-processed and precision layer-level wound aluminum wire for inert-gas welding. A low-hydrogen electrode for a-c/d-c operation has also been put on the market. Three types of coated stainless electrodes are being marketed including a lime d-c type, titania a-c/d-c and lime a-c/d-c.

Weldwire has also put out a new and varied line of nonferrous coated electrodes including phosphor bronze, silicon bronze, aluminum, nickel, cupro-nickel and Monel types. Another product is a mild steel electrode for welding plates up to $\frac{3}{4}$ in. thick without edge preparation. Demand for these products has fostered three distinct expansions and tripled production area since actual manufacture began in March, 1952.

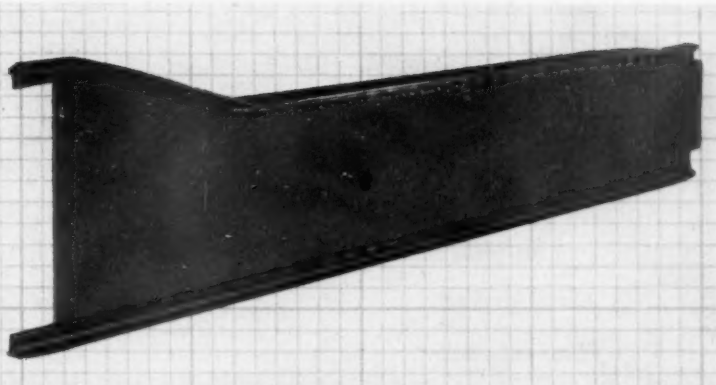
* * *

Flashwelding Firm Exhibits at Trade Show

JOINING some 80 local firms of the Franklin Park (Illinois) Manufacturers Association in the second annual products exhibit was Flashweld Industries, a contract and engineering service in resistance welding. Owner of Flashweld is E. R. Sirabian.

Franklin Park has taken a leading place industrially among Chicago suburbs in the last 10 years. Newest plants to move in the area are Binks Mfg. Co., Motorola Corp., Sawyer Biscuit Co. and Ford Motor Co.

Mr. Sirabian's exhibit showed many samples of the economies and superior joints that are being produced by flash welding.

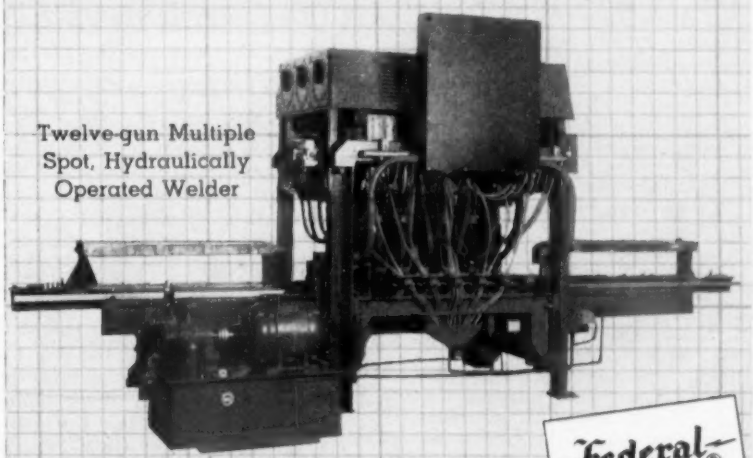


15,000 WELDS per HOUR

FEDERAL WELDER INCREASES PRODUCTION, CUTS COSTS ON NEW DESIGN AUTOMOTIVE FRAME CROSS MEMBER . .

It's happened again! A leading manufacturer has redesigned a product to receive the benefits of resistance welding. An automotive frame builder redesigned the cross members and asked Federal to build a machine that would weld the sections together.

Federal engineers designed and built two twelve-gun multiple spot, hydraulically operated welders that delivered 190 finished pieces per hour, doubling production and cutting costs by more than 25 percent. The welders are compact, releasing valuable floor space, with open framework that provides easy maintenance. The six 150 KVA transformers are arranged for three-phase distribution to equalize power demands. Equipped with shuttle type fixtures, the machines are constantly working . . . no down time while loading. These and many other features are reasons why this fabricator, like hundreds of others, has turned to resistance welding and Federal Welders for high speed, low cost and uniform quality production.



Twelve-gun Multiple Spot, Hydraulically Operated Welder

Federal® WELDERS

THE FEDERAL MACHINE & WELDER COMPANY

WARREN, OHIO

Warco® PRESSES

If you do AC Bronze Welding, check these Advantages

- No snuff outs
- Easy striking
- Wear resistant
- Corrosion resistant
- Welds dissimilar metals
- High strength
- High ductility
- Can be used with AC or DC

You get them all with AMPCO-TRODE* "AC" Coated Aluminum Bronze Electrodes

THESE Ampco-Trode "AC" advantages mean lower welding costs for you—better, faster jobs—less trouble. Besides the advantages listed you also get a smooth bead that feather-edges perfectly into the base metal — whether it's used on cast iron, malleable iron, bronzes, some nickel alloys, or dissimilar metals.

Moreover, Ampco-Trode "AC" beads are free from porosity and surface pitting. Spatter loss is low, too.

Ampco-Trode "AC" is available in 5 grades having Brinell hardness ranging from 135 to 300, tensiles from 77,000 to 90,000 psi, and yield strengths from 35,000 to 69,000 psi.

For additional information about versatile, money-saving Ampco-Trode "AC" electrodes call your nearby Ampco distributor or write us.

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AMPCO®

AMPCO METAL, INC.

MILWAUKEE 46, WISCONSIN

West Coast Plant: Burbank, California

It's Production-Wise to Ampco-ize!

A. G. BISSELL, welding engineer and top civilian at the Bureau of Ships, Dept. of the Navy, retired officially May 31. A veteran of 37 years in the welding field, he first investigated the arc welding of steel naval vessels in 1918 at the Puget Sound Navy yard. While employed at Puget Sound in 1920, he received the degree of chemical engineer from the University of Washington. His thesis, "The Use of Arc Welding in Steel Ship Construction" is believed to be the first thesis on welding to be accepted for an advanced degree. Mr. Bissell has been with the Navy Dept. in Washington since 1936. An AWS member since 1923, he has served on the board of directors and has been eastern district vice-president and a member of many technical committees. He was the recipient of the Samuel Wylie Miller memorial medial in 1949, given for conspicuous contributions to the advancement of welding. Mr. Bissell will move back to Seattle, where his address will be 1806 E. 65th St. His successor has not been announced.

* * *

EUGENE MCMURRAY has been named production engineer for Roylyn, Inc., Glendale, Calif. HENRY T. YOUNG succeeded McMurray as chief of production planning. GEORGE A. STREVER was named division sales manager of the western division.

* * *

A. F. DAVIS, vice-president and secretary of The Lincoln Electric Co., Cleveland, has been elected president, for a two year term, of the alumni association of Ohio State University. He graduated from Ohio State in 1913 with a degree in electrical engineering and has been an ardent supporter of his alma mater. He established and has developed there the A. F. Davis Welding Library, said to be the largest and most complete collection of material on welding in the world.

Sellstrom QUALITY EYE AND FACE Safeguards

GIVE YOU EXTRA LABOR HOURS

If your welders can increase their production time by only one-half hour a day, just think of the extra savings this means in one year.

The Sellstrom No. 420 Welding Goggles cannot help but give you a substantial "extra welding production" because the abundant air ventilation assures greatly increased welding efficiency.

1. Side walls of each eyecup have six ½" patented ventilating ducts with extra baffles on each side of the frame. Eight light-proof ventilating ducts for each lens reduce fogging to a vanishing point, thus permitting extra labor hours as it is not necessary to stop work regularly to wipe the fog from the welding lenses.
2. Frame is moulded from rugged thermal setting plastic. All parts contacting the face are carefully rounded for comfort.
3. Single ball chain nose bridge adjustable to 1/1000 inch for perfect fit on any face. Extremely light weight, including lenses 3½ ounces.
4. The anti-fogging feature has made the Sellstrom No. 420 welding goggles most popular among welders, not only in the U. S., but equally so in Europe, North, South and Central America. Each pair in an individual box.

The No. 420 Sellstrom Welding Goggles are obtainable at all the prominent dealers. If your dealer cannot supply you, write us direct.

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Let Sellstrom Safeguards Protect Your Eyes and Face

626 N. Aberdeen St. Chicago 22, Ill.

KENNETH V. LUTZ has been appointed general field manager of All-State Welding Alloys Co., Inc. He joined All-State in 1948 and has recently been regional manager for 11 western states and Hawaii. In the past five years he has conducted 170 clinics and 1,600 plant demonstrations. After learning to weld in the Navy in 1935, he accumulated more welding knowledge at Welders Supply Co., Seattle; Ferrofix Welding and Engineering Co., Seattle; Puget Sound Naval Shipyard, Winslow Marine Shipbuilding Corp. and also as a senior inspector Ship Construction (welding), Bureau of Ships.

* * *

JOHN L. GOHEEN has been appointed district manager for commercial research on the west coast for American Brake Shoe Co. He joined Brake Shoe as a research metallurgist in 1943.

* * *

ROBERT L. RICHARDS is president of the newly formed Sightmaster Corp. of Illinois, distributor of steel products, welding rods and electronic equipment. Treasurer of the new company is Michael L. Kaplan, president of Sightmaster Corp., with plants at Santee, Calif.; Louisville, Ky. and New Rochelle, N.Y. Secretary and general manager of Sightmaster of Illinois is Ben C. Rose.

* * *

CHARLES M. NORLIN, of Detroit, has been appointed regional manager for All-State Welding Alloys Co., to cover the states of Michigan, Indiana and Illinois. He was in North Carolina as a production welder for three years before going to Lehigh University and graduating with a B. S. in Metallurgical Engineering in 1943. Before joining All-State, he was a sales and service engineer for Detroit Electric Furnaces, a field engineer for Erico Products and the founder of Y-dac Welding Supply Co.

* * *

EWALD CARLSON is new assistant superintendent of Kaiser Steel's electric weld pipe mill at Fontana, Calif. He was previously general foreman.

Photo Courtesy Peerless Welding Co., St. Louis, Mo.

✓ THE MECO CIRCLE MIXER—Correctly proportions welding gases for maximum efficiency and superior results without creating the least resistance to their flow.

✓ SPRING TENSION NEEDLE VALVES—Insure permanent adjustment at any point. Adjustments can be accurately made and held in place regardless of bumping or jarring of welding handle.

✓ ARMORED GASKET TYPE JOINT—Provides a leak-proof seal between torch handle and mixing chamber, or torch handle and cutting attachment—minimizes wear.

Meco FREE—send for New MECO Catalog No. 150 today!

Modern Engineering CO., Inc.

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PROVEN PERFORMANCE makes Rebuilding WORN GYRATORY, ROLL & JAW CRUSHERS

WITH MANGANAL

U.S. Patents 1,876,738—1,947,167—2,021,943

11%-13½% Manganese-Nickel Steel

ROUND APPLICATOR BARS

Your Best Buy!

- Outlasts new parts — cuts maintenance costs.
- Speeds repairs — minimizes build-up time.
- Thrives under severe impact and abrasion.

USE Manganal Electrodes to fill in low spots and attach Applicator Bars.

Send for FREE helpful tips on speedy and economical repair of worn equipment. Also FREE Manganal Wall Chart. • NEAREST DISTRIBUTOR UPON REQUEST

STULZ-SICKLES CO.

SOLE PRODUCERS 92 N. J. RAILROAD AVE. NEWARK, N. J.

Build up with...
All-State No. 13
Nickel-Silver ☑
Retemper...
None
Required ☐

• Dirt Mover Gears and Pinions • Finely Heat Treated • Reclaimed in 14 hr. with 25 lb. All-State No. 13 • Saved $510. net.

• Steam Processer Packing Gland Journal • None reclaimed before • 20 lb. of All-State No. 13 included in $300. overall repair • Saved replacement at $1300.

• Dripless Ball and Cone Valves • Rejections reduced to zero since adopting All-State No. 13 • High resistance to abrasion and galling is imperative.

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JAMES A. ROUSMANIERE has been appointed general manager of the cylinder division of the Taylor-Wharton Iron and Steel Co. He was formerly in charge of all sales and advertising activities as related to the high-pressure forged steel cylinders made in the company's plant at Easton, Pa. He will now also coordinate all phases of the cylinder producing program. Among new products the cylinder division is working on is an improved lightweight plastic cylinder with spun glass reinforcement.

* * *

L. J. MARRELL and J. E. FITZGERALD have been appointed, respectively, midwest and southern field representatives for Alloy Rods Co. Mr. Marrell will contact Alloy Rods distributors in seven middle western states with headquarters in Chicago. He has been in welding for 20 years with prominent manufacturers in sales and sales engineering activities with emphasis on metallurgical activities. Mr. Fitzgerald was formerly with Riverside Metals Co. and specialized in metallurgical training at Temple University. He has been with Alloy Rods for two years.

* * *

ERHARDT C. KOERPER has been appointed works manager of Ampco Metal, Inc., Milwaukee. For the past 9 years Mr. Koerper has been with A. O. Smith as assistant executive engineer in special products engineering works and in coordination between laboratory and production floor. He has served as a consultant with the Air Force on engineering and production. A graduate of the University of California, he holds degrees in both mechanical and electrical engineering. He has also completed a course in industrial management at the Harvard graduate School of Business. He will direct all production at Ampco. Mr. Koerper is identified with several civic associations and is active in professional societies.

* * *

SAMUEL A. WENK has been named to supervise nondestructive testing research at Battelle Memorial Institute, Columbus, O.

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THE GRAND QUIKCET DUAL GRIP TYPE "AS"

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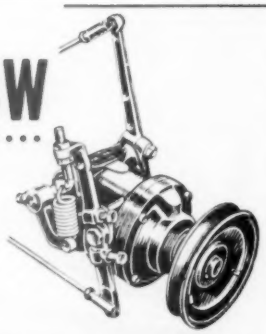

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FRED ROGERS, welding engineer, has joined Interstate Machinery Co., Chicago, as a special representative for Rex Welders.

* * *

WILBUR A. JUERGENS, treasurer of Machinery & Welder Corp., has occupied the company's new offices at 230 E. Ohio, Chicago 11, where general administration and accounting will be centered. Sales and service activities at Chicago will remain at 1324 W. Fulton.

* * *

WILLIAM J. GREENE has been appointed assistant director of metallurgical research at the Air Reduction Company's laboratories at Murray Hill, N.J. He joined Airco in 1946 as a research and development engineer and has served successively as assistant to the manager and assistant manager of the metallurgical process division.

* * *

L. D. DRAPER has retired as works manager at the Bethlehem, Pa., plant of Bethlehem Steel Co. He has held the post 27 years and will be succeeded by Richard Crabb. Mr. Draper is a member of the American Welding Society, American Society of Civil Engineers and the American Standards Association.

* * *

Died . . .

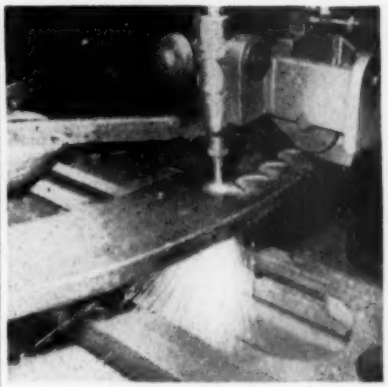
JAMES W. MCLAUGHLIN, vice-president, Union Carbide and Carbon Corp., died May 15 at the age of 62. He was chairman, Bakelite Co. and Bakelite Co. (Canada) Ltd.; vice-president, Carbide and Carbon Chemicals Co. and vice-president and director, Carbide and Carbon Chemicals Co., Ltd. In Dec., 1918 he was appointed superintendent of the Hammond, Ind., plant of The Prest-O-Lite Co., Inc., and was associated for many years with various Prest-O-Lite and Linde Air Products Co. plants in the midwest and on the Pacific coast. He was made chairman of Bakelite Co. in 1952.

* * *

EDWARD C. BADEAU, 58, editor of *Inco* magazine and in charge of the special publications section of The International Nickel Co., Inc., died May 24. He joined Inco in 1929 and was a past president of the International Council of Industrial Editors.

* * *

ROBERT C. WELLER, 68, owner of Buffalo Welding Supply Co., Buffalo, N.Y., died May 20 after a brief illness. He is survived by his wife, two daughters, two sons, a sister and brother.



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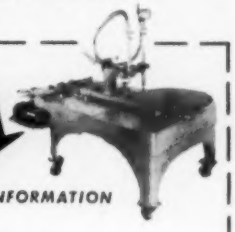

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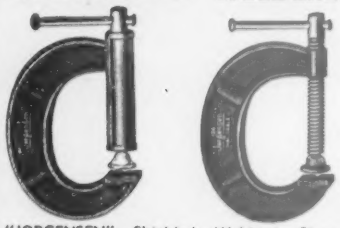

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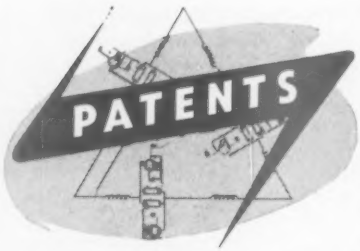
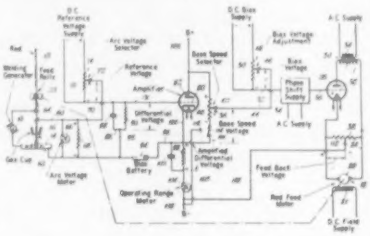


Automatic Metal-Arc Welding

2,636,102. Roscoe R. Lobosco, Elizabeth, N. J. Assigned, by mesne assignments, to Union Carbide and Carbon Corp. Filed June 27, 1950. Granted April 21, 1953.



This patent covers a circuit for automatically controlling the rate of rod feed in an arc welding system, comprising a rod feed motor, at least one thyratron whose output controls the speed of the rod feedmotor and means controlling the output of the thyratron. The latter means includes applying to the input circuit of the thyratron a positive voltage of such magnitude that the thyratron delivers a current which drives the rod feed motor at approximately the correct speed to maintain a desired arc voltage. Other means apply to the thyratron input circuit a voltage proportional to the difference between the such desired arc voltage and the actual arc voltage. Other means apply to the input circuit a negative voltage proportional to the speed of the rod feed motor, thereby automatically maintaining the actual arc voltage substantially at the desired value.

* * *

Welding Electrode

2,635,166. Sven Svantesson, Stockholm, Sweden. Assigned to Allmanna Svenska Elektriska Aktiebolaget, Vasteras, Sweden. Filed June 14, 1951. Granted April 14, 1953.

This patent refers to an electrode for arc welding unalloyed or low-alloy iron or steel. It comprises a core wire having a carbon content of 0.13-0.25% and a coating including a binder and from 20 to 80% iron powder. The thickness of the coating is such that the total cross-section of the electrode is from 4 to 9 times the diameter of the core wire.

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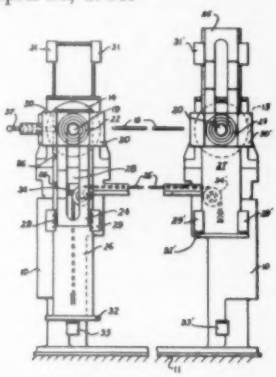
Die Spacers for Flash Welders

2,636,966. MELVIN M. SEELOFF and ROBERT ANDERSON, Warren, O. Assigned to The Taylor-Winfield Corp., Warren, O. Filed May 5, 1952. Granted April 28, 1953.



This patent refers to a flash welder having fixed and movable workholding platens. Spaced first and second upset cylinders move the movable platen toward and away from the fixed platen. Rearwardly extending shafts and bucking nuts are associated with each of the upset cylinders for limiting the forward movement of the movable platen toward the fixed platen. The combination of a first vertically disposed elongated abutment plate is interposed between the first upset cylinder and bucking nut. Means guide the first abutment plate in vertical movement with respect to the first cylinder. The abutment plate has a plurality of stepped gage faces thereon of progressively increasing thickness from top to bottom, a second vertically disposed elongated abutment plate is interposed between the second upset cylinder and bucking nut. Means are provided to guide the second abutment plate in vertical movement with respect to the second cylinder. The second abutment plate has a number of stepped gage faces thereon of progressively decreasing thickness from top to bottom. The abutment plates each are substantially of the same weight. Means interconnecting the first and second abutment plates are operative when one of the abutment plates is moved in a first vertical direction to move the other of the abutment plates in the other vertical direction. The last mentioned means and the plates are so oriented that corresponding gage faces of each abutment plate will move into operative position upon movement of one abutment to place a gage face in operative position.

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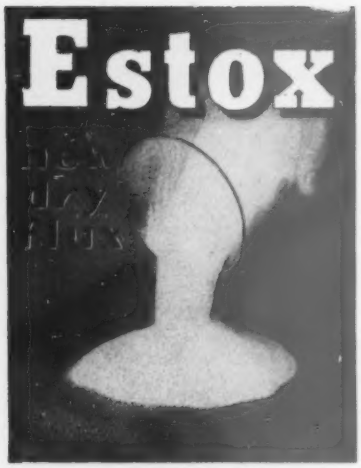

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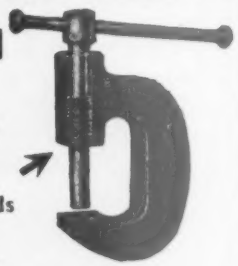

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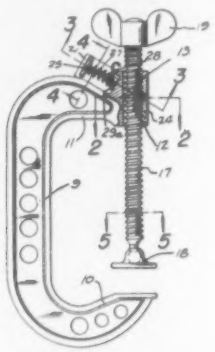
2,636,528. JOHN C. GOLNICK, Richmond, Va. Filed April 24, 1948. Granted April 28, 1953.



This patent refers to a C-clamp with a supporting body; a head on the body has a passage formed through it and is provided on one side with a recess extending inwardly from the outward side of the head into the passage. The recess has upper and lower sides inclined to the axis of the passage. A threaded screw projects through the passage and is movable longitudinally thereof. An abutment jaw on the body is positioned in alignment with the screw. A frame has a nut forming member mounted on and projected inwardly from one end of the frame. It is engageable in the recess and provided on its inner side with threads engaging the threads of the screw. The frame embraces the head and projects outwardly beyond the same at the side opposite in which the recess is formed. A spring is positioned in the frame and engages at one end the inner surface of an end wall of the frame. A plate has a stud projected through it and extending from opposite faces thereof. One end of the stud enters the opposite end of the spring. The opposite end of the stud engages in a recess formed in the head within the marginal limits of the frame. The plate extends into the frame. A gripping portion on the plate extends beyond the frame.

* * *

Copper-Tin Electrode

2,636,101. LELAND A. DE PUE, Takoma Park, Md. Filed Sept. 7, 1949. Granted April 21, 1953.

An uncoated arc welding electrode is formed of a zinc-free alloy which consists essentially of about 10% tin, between about 0.4 and 0.41% phosphorus, and the balance copper.

MARRIAGE: *a community consisting of a master, a mistress, and two slaves, making in all, two.* —*Ambrose Bierce*

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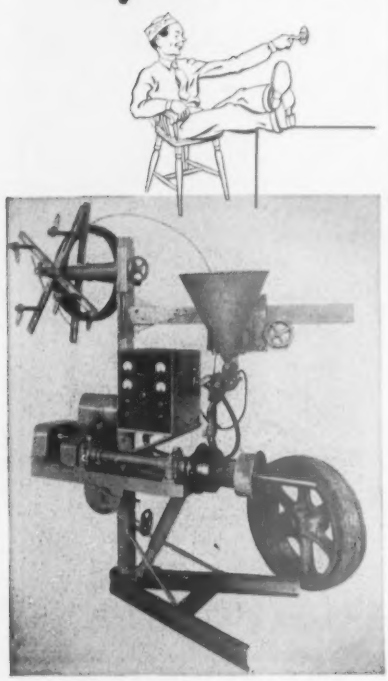

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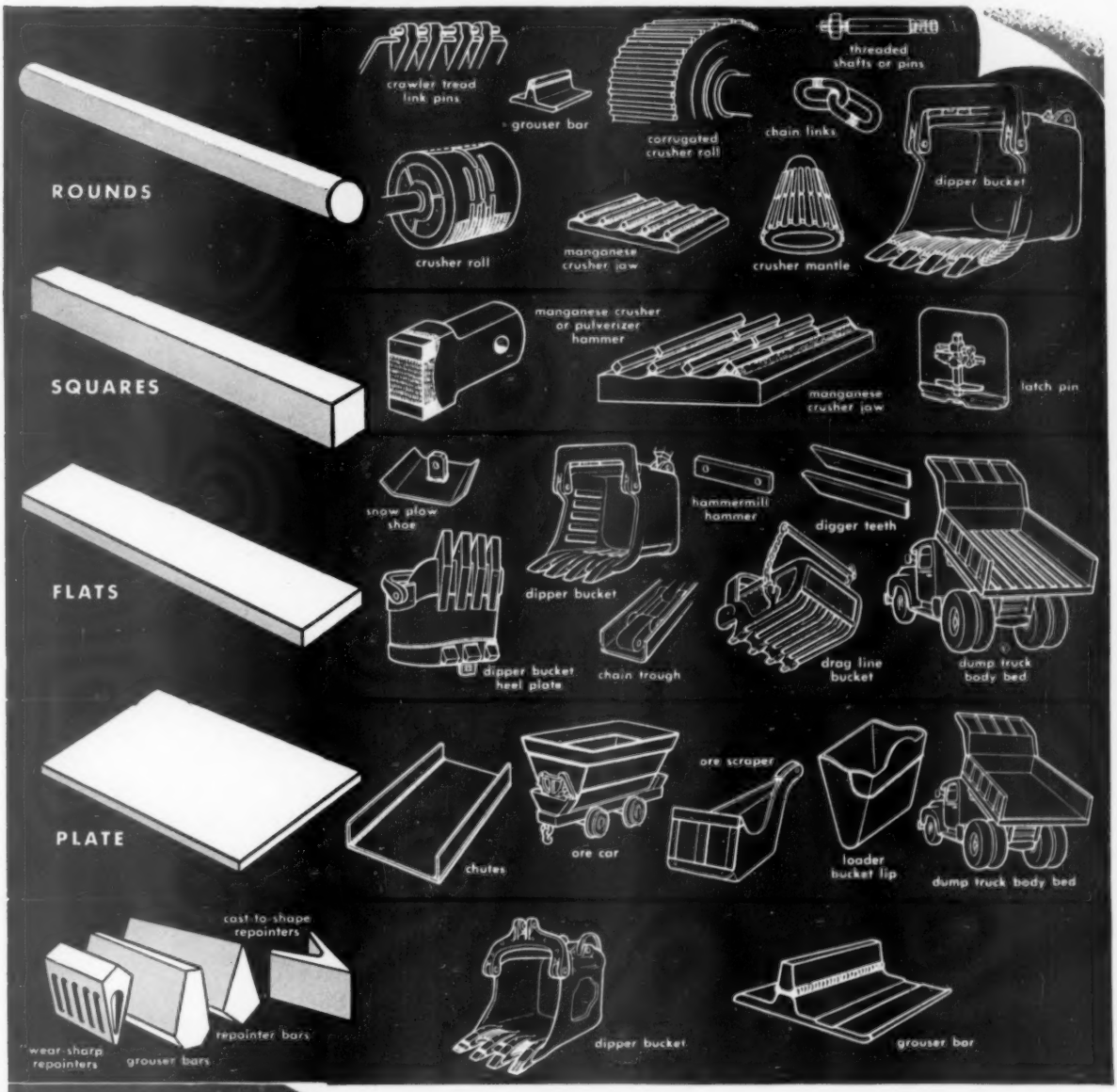

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SW-153	410
SW-154	430
SW-157	347
SW-158	317 + Cb
	318
SW-159	310
SW-160	316
SW-161	317
SW-162	308
SW-166	309
SW-168	310 + Mo
SW-169	310 + Cb
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